August 30, 1943

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

TECHNOLOGY DEPT.

PUBLIC LIBRARY
AUG 30 1943
DETROIT

USING OUR HEADS TO SPEED DEMOCRACY'S VICTORY

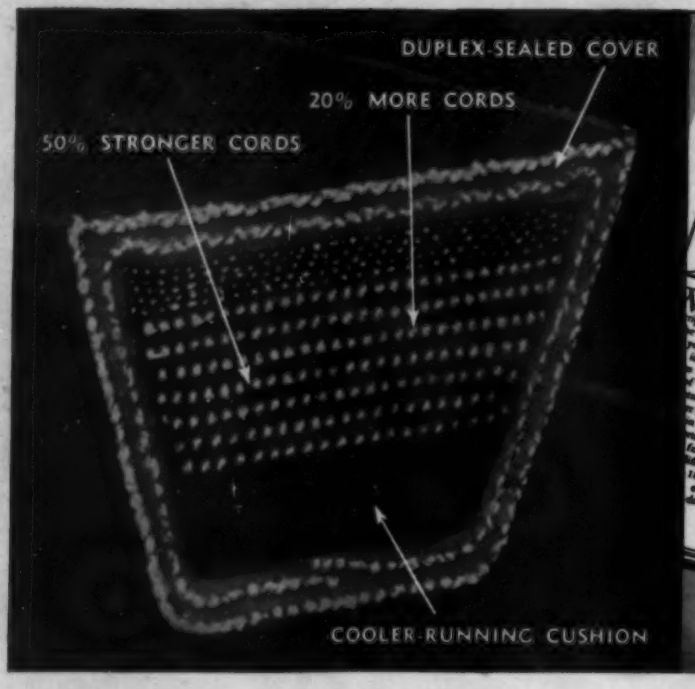
WORTH

Of course they're using Worth Sheared Steel Plates

WORTH STEEL CO. CLAYMONT, DEL.

War Slogan FOR V-BELTS— "Make 'em Last!"

(HERE ARE TWO WAYS TO DO IT . . .)



1 **BUY THE BEST BELTS . .** Texrope Super-7's new design-against-wear gives maintenance a head start. The 20% more cords — made 50% *stronger* by the new Flexon process — combat stretching, give Super-7's extra pulling power. Revolutionary new shock-absorbing cushion of special cool-running rubber eases pulling cords around sheaves. Tough, new Duplex-Sealed cover protects inner belt structure against grit, grime and moisture. When you *do* need new V-belts, *invest in the best* — Texrope Super-7!

2 **USE THE BEST CARE . .** Whatever brand of V-belts you now use, you can make them last *longer* by following the tips in Allis-Chalmers' free handbook: "Plain Facts on Wartime Care of Rubber V-Belts." How V-belt anatomy affects maintenance . . . what determines V-belt "life expectancy" . . . here is the full story, packed with practical data — fully illustrated. The new handbook contains no advertising, applies to *all* makes. Tear off the coupon below and send for *your* copy of this valuable new handbook today!

ALLIS-CHALMERS

TEXROPE SUPER-7 V-BELTS

WE WORK FOR VICTORY — WE PLAN FOR PEACE

Trade mark registered U. S. Patent Office. Texrope Super-7 V-Belts are the result of the cooperative research and design genius of two great companies—Allis-Chalmers and B. F. Goodrich—and are sold exclusively by Allis-Chalmers. Available in all sizes.

ALLIS-CHALMERS MFG. CO.
Milwaukee, Wisconsin

Gentlemen:

Yes, I would like to receive free of charge a copy of your "Plain Facts on Wartime Care of V-Belts".

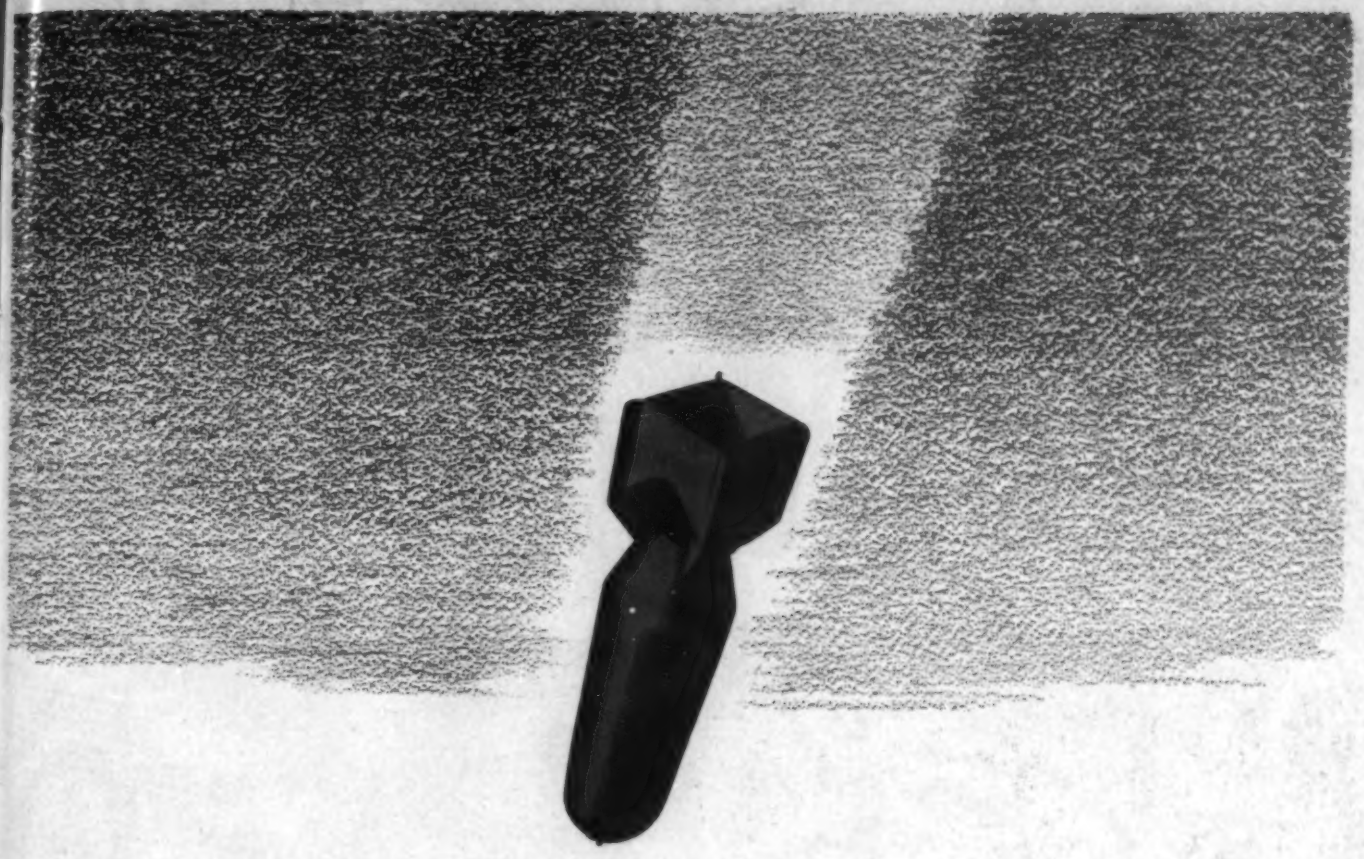
(Name) _____

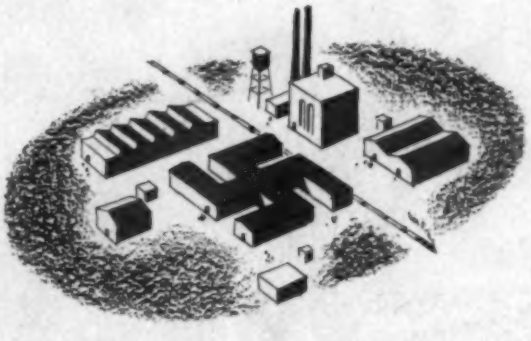
(Title) _____

(Company) _____

(Street Address) _____

(City and State) _____ A-1606-F





On target • Without the thin steel fins which hold a dropping bomb steady on its target, our bombardiers might as well open the bomb bays and just let 'em go overboard. The deadly-accurate Norden bombsight would be useless. There's nothing amazing about those steel tail-fin sheets —nothing except the fact that they must be produced fast—and well. This is one of the war jobs on which Bethlehem sheet mills are hard at work

BETHLEHEM STEEL

JOB OR DOLE

—which?

All Americans agree that men returning from the war should be assured the four freedoms they are fighting for—especially freedom from want and freedom from fear.

We disagree, however, with the implied premises from some in high places that such freedom should be gained by continued governmental support, rather than through the resources of free enterprise.

The way to provide for these men is with jobs—doing useful work, making and selling things that will maintain our American standards of living, and help these men maintain their own self respect.

To make these goods, we'll need new tools. Many machines now in use will have worn out under the merciless grind of war production. Many others will be outmoded by new processes, new developments.

Alert manufacturers, even now, are scanning their products, processes and plants with an eye to postwar operation. Such planning offers no interference with War production. For instance, at Monarch, new lathes are already in the design stage, ready for building, testing and delivery, as fast as compatible with our Victory commitments.

We invite American industry to discuss with us, now, their postwar requirements. The time may be short—or it may be long, but much can be gained by starting today to plan for tomorrow. Only in this way can we be ready to welcome our men of war into peacetime jobs that will insure them the fruits of the Victory they will have won.

THE MONARCH MACHINE TOOL COMPANY · · · SIDNEY · OHIO

MONARCH LATHES

Save Time

BEHIND THE SCENES

Wrong Apology

■ G. H. "Doc" Manlove, associate editor who recently was honored for completing his thirtieth year with STEEL, wants to know why the apologies to Edward Everett Hale in connection with Peter Fairfax Meyer's poem we ran Aug. 16. Doc says, and he knows whereof he speaks, that the man who wrote the poem which was parodied died when Hale was ten years old, and probably schoolboys were declaiming the poem at Friday school exercises before Hale was born. The original came from the pen of Sir Walter Scott as part of the *Lady of the Last Minstrel*, but Mr. Meyer goes blithely on batting out more verse for us, this one labeled exclusively for STEEL, which makes us very proud. It is called "The Conference."

They sat in solemn conference, upon a busy day,
For they were busy men, with hair of iron grey.
Some secretaries came and went, with soft and cat-like tread,
They feared they might disturb the words of wisdom that were said.

Now in the outer office sat a score of eager gents,
Who waited for the ending of the solemn conference.
But time and tide and railroad trains are passing incidents
When business men are gathered in a solemn conference.

So presently the president arose to speak his piece,
His voice was calm and steady—as smooth as axle grease:
"I know," he said, and eager eyes lit up each eager face,
"I know a guy with 10-year rye at eighty bucks a case!"

Conference Report

■ Speaking of conferences, there was one the other day out in San Diego, during which one of the group was asked to comment upon the work he was doing. He began with a question as to whether he should report on a "corset" or "brassiere" basis, and the chairman, of course, had to ask what he meant. He replied that he simply wanted to know whether he should cover the subject completely or only the high points!

Puzzler

■ No doubt we better quickly change the subject and let you go to work on this puzzler we just read in the *Armco Farm Equipment Merchandiser*. A four-inch cube is painted black. Then it is cut up into one-inch cubes. How many one-inch cubes would be painted on three sides, two sides, one side and no side at all? No fair using pencil and paper, but the correct answer should be worth at least a short beer.

Patent Plan

■ The old sad story about the poor inventor who starved in a cellar while the boss waxed rich off the fruit of his labors will never be told about an employe of the Glenn L. Martin Co. now that they've set up an Employes' Patent Remuneration Plan giving an equitable share in any income derived from an invention through the licensing of outside manufacturing rights.

In the short time the plan has been in operation seven Martin inventors are already somewhat richer. Patents have been granted for a "round-the-corner riveter adapter," a device for dimpling airplane skins without stretching or distorting, a two-piece plastic control handle for gun turrets, an oil temperature control valve which regulates the temperature of oil entering an airplane engine, a special fuel container and a swivel joint assembly for introducing oxygen lines and inter-phone wiring connections into a continuously rotating power turret.

The Martin Patent Department handles all details of applying for and securing the patent, negotiating manufacturing licenses with other companies, and the collection of royalty payments all without charge to the employe. The employe-inventor receives 10 per cent of the proceeds from any such licensing up to $5000 and on a sliding scale thereafter.

Here is a plan with a very definite two-way benefit. Does it give you an idea for your own plant?

War Enterprise

■ *It-could-only-happen-in-a-press-release-department:* Bennie Mitnick, Chevrolet dealer in the way-town of Tallapoosa, Georgia, population 2400, stores and business places 23, is meeting with considerable success these days garnishing camouflage (interweaving burlap strips through chicken wire) for the U. S. Engineer's Office, utilizing seven "ghost" buildings, hitherto empty shells of Tallapoosa's more prosperous times. He employs 400 women, a number of them deformed and crippled, still others deaf and dumb. Overlooking the scene is a wooden hulk of the Lithia Springs hotel, relic of the 1890's when prospectors thought they had discovered rich deposits of gold, silver and copper in the area. Calling Boris Karloff!

Worth Reading

■ Regardless of your own company's postwar planning —whether it's in full swing, just getting started, or still awaiting the light of day, we urge you to write for a copy of the Committee for Economic Development's newest booklet—*Plan Postwar Jobs—Now*. Either your own local CED or the Field Development Division, Department of Commerce Bldg., Washington should have a supply on hand.

Maybe They Have Something

■ One of our Washington undercover men reports that the employes in the Pentagon Building are starting quite a movement for portal-to-portal pay.

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Editorial Contents—Page 25

Acceptance Proves Value

HEARTH PATCH is a war-born refractory that has made good.

Open hearth men, driving furnaces for more and more steel to meet war needs, called for an emergency patch material . . . something that could be dumped into large bottom holes to make strong, safe repairs with minimum loss of time. Hearth Patch was the answer.

Just how well Hearth Patch serves this purpose is demonstrated by its steadily growing acceptance. Month after month, the tonnage used increases. New customers are trying it, liking it, becoming regular users.

Hearth Patch is designed solely for emergency repairs. A fine-grained, fast-setting magnesite, it is intended to be thrown quickly, without slag addition, into deep holes while the furnace is still very hot. Thus properly applied and given a working surface of dolomite clinker, it consolidates into a dense repair. At the end of a campaign, such patches should be dug out and replaced with more permanent repairs of Ramix.

Our Service Engineers are prepared to assist your personnel in proper ways to use Hearth Patch and other Basic Refractories products—to help you make maximum savings in production time with good refractories.

BASIC REFRACTORIES, INCORPORATED

CLEVELAND, OHIO

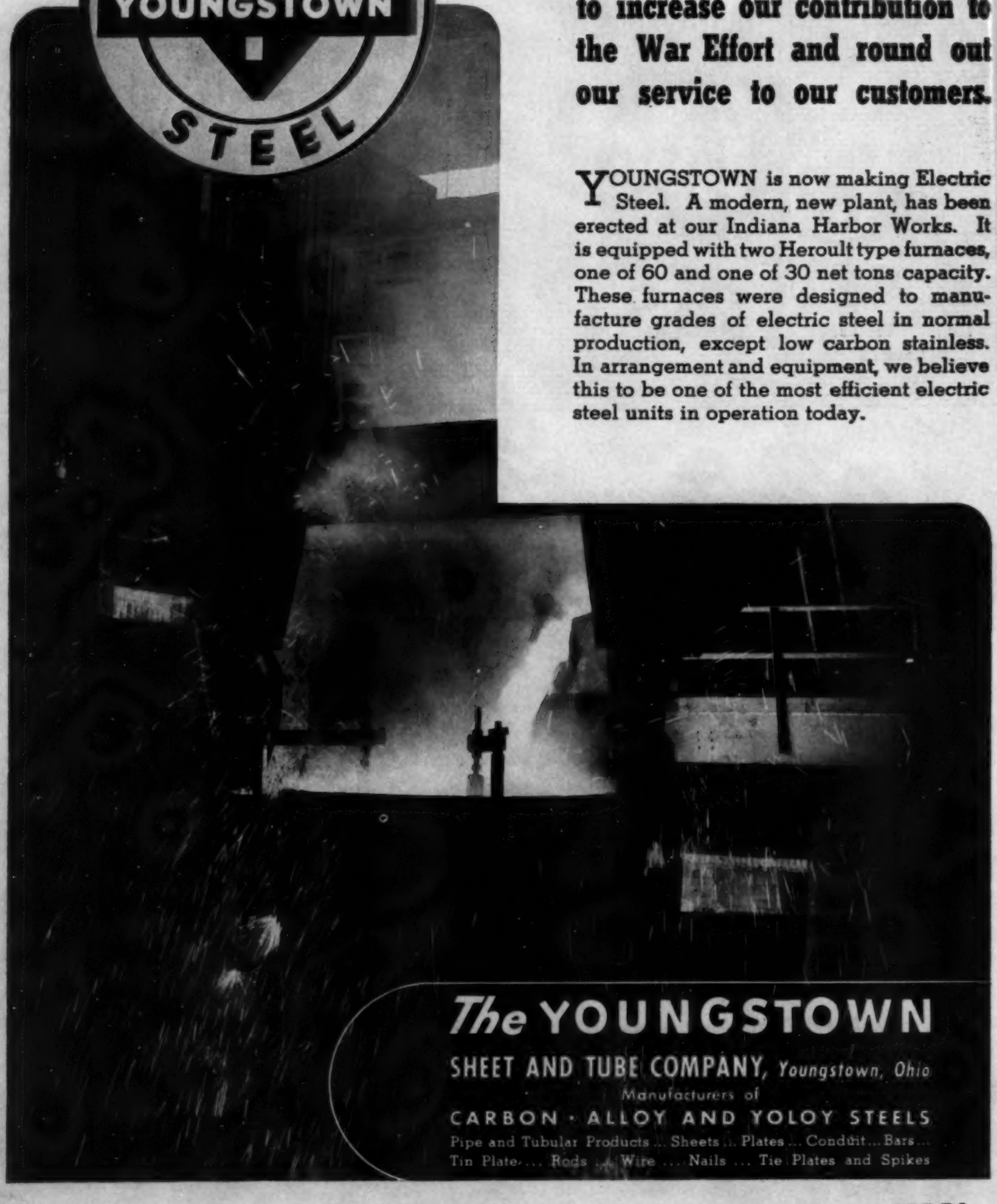
What's Behind the Trade Mark?

ALLOY TRADE MARK V YOUNGSTOWN STEEL

Electric Steel-

to increase our contribution to the War Effort and round out our service to our customers.

YOUNGSTOWN is now making Electric Steel. A modern, new plant, has been erected at our Indiana Harbor Works. It is equipped with two Heroult type furnaces, one of 60 and one of 30 net tons capacity. These furnaces were designed to manufacture grades of electric steel in normal production, except low carbon stainless. In arrangement and equipment, we believe this to be one of the most efficient electric steel units in operation today.



The YOUNGSTOWN

SHEET AND TUBE COMPANY, *Youngstown, Ohio*

Manufacturers of

CARBON · ALLOY AND YOLOY STEELS

Pipe and Tubular Products ... Sheets ... Plates ... Conduit ... Bars ... Tin Plate ... Rods ... Wire ... Nails ... Tie Plates and Spikes

Rubber stopped the earthquake that shook china off the shelf

A typical example of B. F. Goodrich product development

THE neighbors started complaining when the giant stamping press in the picture was put to work in the factory. Every time the die came down —backed by 90 tons of pressure—an artificial earthquake shook the neighborhood. In the house next door dishes in the china closet were bounced from their shelves to the floor. Lawsuits were threatened unless some way could be found to soak up the shocks from the huge machine.

First the manufacturer tried big blocks of concrete, placed beneath the press. But the building was built on sand. And beneath the sand was quicksand which sent the miniature earthquakes on their way.

Then he heard of Vibro-insulators, the B. F. Goodrich development that uses rubber in a new way. Vibro-insulators can support industrial machines as though they are hanging or floating. Rubber layers are sandwiched between metal plates, which are held so that the weight of the machine gives a slight pulling or twisting action to the rubber. This way the rubber can absorb more shock and vibration than when it is under compression.

Vibro-insulators, made in 12 standard sizes, vary in their application all the way from the use described here to mountings for delicate instruments on warships where they give longer life and essential accuracy to instruments vital to the safety of ships and men. *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F. Goodrich

Vibro-insulators

SHOCK TROOPS OF INDUSTRY

*CARBON

TIDEWATER LUBRICANIA

DEFINITION: The Carbon Residue Test is a means of determining the amount of Carbon which remains after an oil has been evaporated under certain conditions of high temperature and under exclusion of air.

TEST (Conradson Carbon Residue): Following a carefully prescribed procedure with standardized equipment, a sample of the oil is heated and the oil vapors allowed to burn. After the vapors cease to come off the heat is raised for a given period to cause the destructive distillation of the remaining liquid. The Carbon Residue is the weight of the carbonaceous residue left in the crucible, expressed in percentage of the original weight of the oil.

EXAMPLES:

(% Carbon Residue)	
Nil	Gasoline
Nil	Kerosene
Trace — 0.05	No. 2 Fuel Oil
0.03-0.25	Machine Oils
0.3-1.5	SAE 50 Motor Oil
1.5-4.5	Steam Cyl. Oils

SIGNIFICANCE: The Carbon Residue Test may be important with fuel oils or gas oils used in certain oil burning or gas manufacturing equipment. As an index to carbon forming tendencies of lubricating oils for use in internal combustion engines, it is totally unreliable. The quantity and nature of such engine deposits are greatly influenced by the oxidation susceptibilities of the oil and other factors peculiar to engine operation. Oils high in resistance to oxidation and otherwise most desirable for heavy duty operation often give relatively high Carbon Residue values.

DRUMS! DRUMS! DRUMS!
War needs make it extremely important that all empty drums be returned immediately.

To assure the unvarying high quality of Tycol Products they are rigidly controlled and subjected to all essential tests during manufacture. Tycol lubricants for internal combustion engines are available in different types and grades to meet different conditions of operation. Call upon the Tide Water industrial engineers who will recommend the Tycol product best suited to your problem.

TIDE WATER ASSOCIATED OIL COMPANY

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Principal Branch Offices: Boston, Philadelphia, Pittsburgh, Charlotte, N. C.
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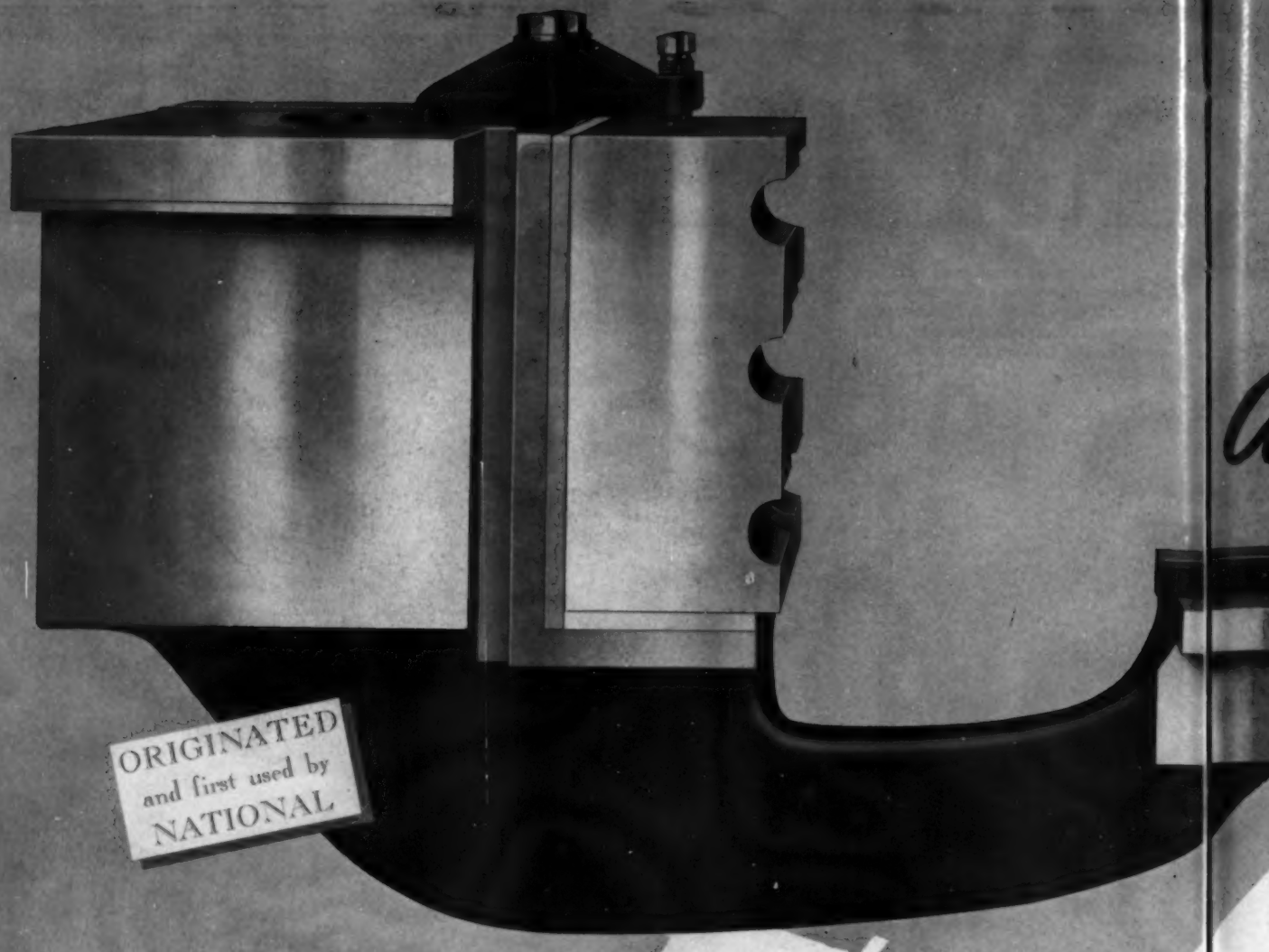
RESIDUE

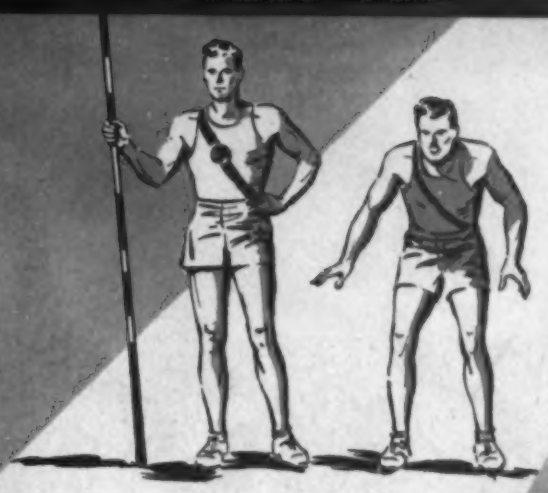
*This is #4 of a series of informative messages concerning the meaning and significance of commonly used tests and terms employed to describe the characteristics of lubricating oils.

INDUSTRIAL LUBRICANTS



EXTENDED PILOTED GRIPPING SLIDE

No other construction has contributed so much to the production of accurate, low weight, minimum finish machine forgings as has this slide . . . originated and first used by National many years ago.



Always First Up...and First Over

National engineers never rest upon their laurels. Instead, they constantly strive to improve. This aggressive engineering spirit enables National Forging Machines to continuously scale new performance heights.

NATIONAL

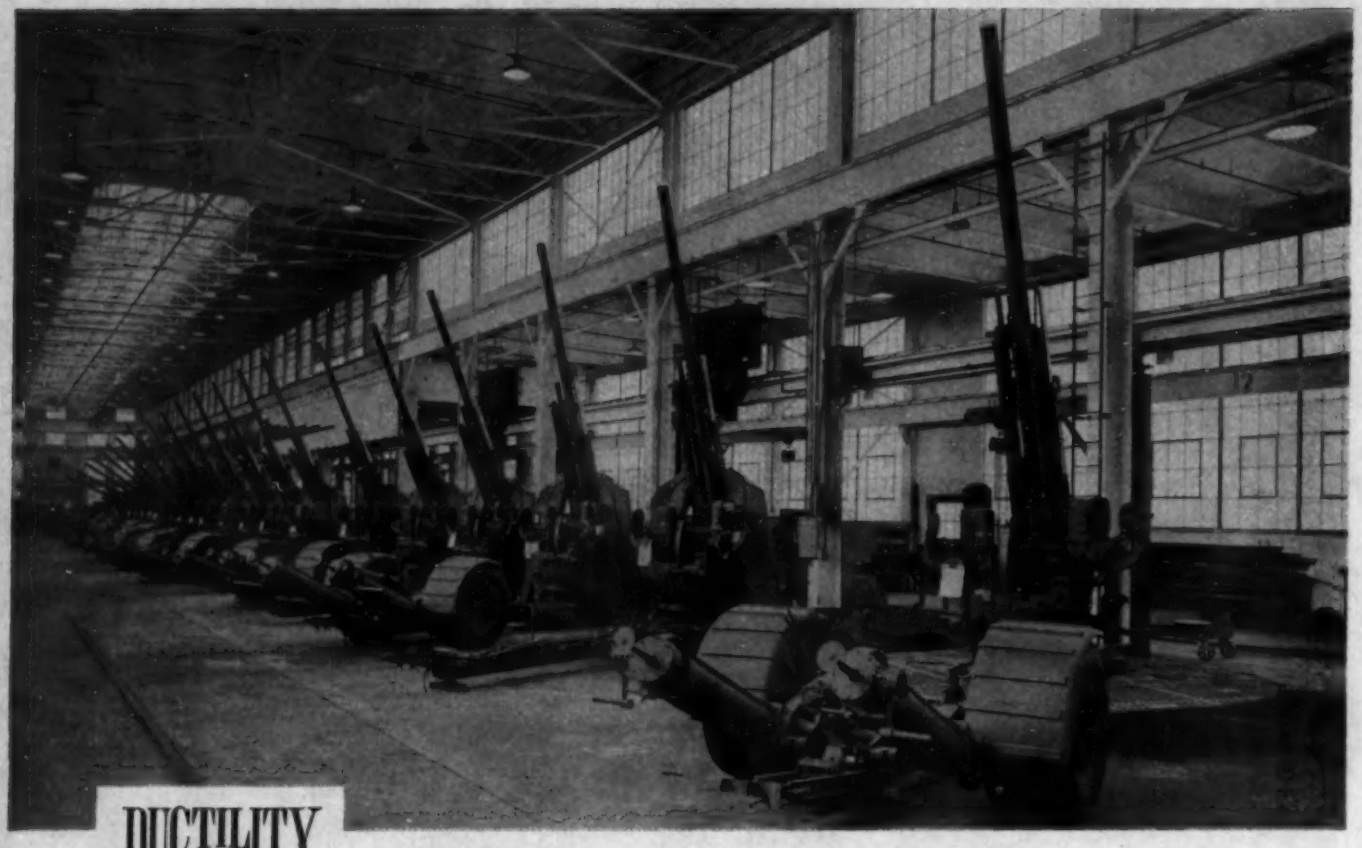
MACHINERY COMPANY

TIFFIN, OHIO

NEW YORK DETROIT CHICAGO

NATIONAL HIGH DUTY FORGING MACHINE — Built in 1-inch to 9-inch sizes

On the production line!



DUCTILITY

ITS INHERENTLY FINER GRAIN MAKES ALL THE DIFFERENCE

STRENGTH

90 mm Anti-Aircraft Guns and N-A-X High Tensile

On production lines in scores of war plants, N-A-X HIGH TENSILE Steel and the manufacturing skill of American industry are combining to turn out more and more of the world's finest fighting equipment.

A case in point is the production of 90 mm Anti-Aircraft Guns by the Holyoke Works of the Worthington Pump and Machinery Corporation.

N-A-X HIGH TENSILE Steel is used in the manufacture of carriages and mounts for these guns because it has the properties needed for such equipment—high strength, unusual ductility, excellent weldability, and high resistance to impact and fatigue under widely varying temperatures. This latter property is of special importance because guns like these must perform accurately and dependably, whether in the Aleutians or in the Solomons, in Russia or in Africa.

For full information, send for your copy of a new booklet on N-A-X HIGH TENSILE—and N-A-X 9100 Series of Alloy Steel.

GREAT LAKES STEEL CORPORATION

Detroit, Michigan

Sales Offices in Principal Cities

Division of

NATIONAL STEEL CORPORATION

Executive Offices • Pittsburgh, Pa.

MORE production per hour on shearing long sheets is made possible by the advanced design of 16, 18 and 20 foot Niagara Power Squaring Shears. Features include accurate, flat cutting; convenient handling of stock and offcut; more working strokes per hour; instant acting 14-point engagement sleeve clutch; gears mounted between anti-friction bearings; clutch and gears operate in oiltight case; self measuring, ball bearing, parallel back gage. Write for Bulletin 72. Niagara Machine & Tool Works, 637-97 Northland Avenue, Buffalo 11, N. Y. District Offices: Cleveland, Detroit, New York.

Shear knives available for cutting alloy and special steels. Let us know what you desire to cut. Prompt delivery on spare knives for Niagara Squaring Shears. Also factory grinding service by the same skilled men who grind new Niagara knives. —Advt.

For Carbon Combustion and Special Organic Analysis

(UP TO 2000° F.)

HEVI DUTY COMBUSTION TUBE FURNACES

● Two HD99-A Combustion Furnaces with a Standard Combustion Train are used to determine carbons at the Anderson Laboratories, Milwaukee, one of the largest commercial laboratories in the middle west. Ease and accuracy of operation of this Hevi Duty combustion furnace permit a large volume of daily analyses.

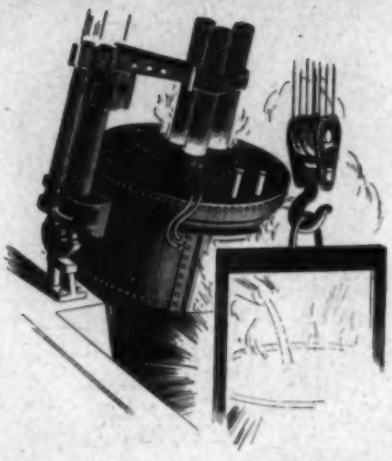
See Your Laboratory Supply Dealer or Send for Bulletin HD-1236.

HEVI DUTY ELECTRIC COMPANY

HEAT TREATING FURNACES EXCLUSIVELY

MILWAUKEE, WISCONSIN

Practical Men to Give Practical Help Where Alloy Steels are Made and Used



Electromet field men, because of their broad steel-plant experience, are frequently asked to help solve difficult steel problems. They are located in every major steel-making center. They talk the steelmaker's language and understand his problems.

These field metallurgists can advise on the selection and best use of the sizes and grades of ferro-alloys available. They are familiar with a wide group of alloys; they do not have one "stock" answer for all problems. And their experience is backed by an extensive research program in the development of better alloy steels.

In your design-engineering department, Electromet metallurgical engineers are prepared to help solve specific problems in the selection, fabrication, or use of alloy steels — especially stainless steels. If you have a problem in the use of alloys or alloy steels, call on Electromet. Further information about this service and brief descriptions of Electromet ferro-alloys and alloying metals are found in the booklet, ELECTROMET PRODUCTS AND SERVICE. Write for your copy.

BUY UNITED STATES WAR BONDS AND STAMPS

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

Electromet
Ferro-Alloys & Metals

In addition to our popular line of standard-shape Victory Tool Shanks, cast of tough Meehanite, we are supplying many metal working plants with special shapes.

We have found this Meehanite Metal suitable for such things as boring heads and bars, dies, forming tools, milling cutter heads, crankshafts—in fact, any application where high tensile castings are required. As large users of castings in our own engine products, we have excellent facilities for designing, producing and machining quality castings.

Send us a sketch of any special shapes you use, and we'll be glad to quote on patterns and castings to your specifications. You'll be surprised at the moderate cost.

Cooper-Bessemer

THE COOPER-BESSEMER CORPORATION
DEPT. E., MOUNT VERNON, OHIO

BOHN

Modern light alloys engineered and fabricated by Bohn will make the new designs of tomorrow more attractive —more useful—more economical. Transportation units like the startling new bus, shown above, will be based on greater lightness and greater strength. Bohn is a major source for modern aluminum, magnesium and brass applications which possess all required up-to-date advantages. The entire production facilities of this organization are now working for Uncle Sam. But remember the name Bohn. Some day this company might be most helpful to you in formulating your future plans.

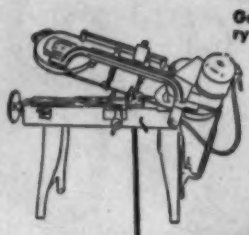
BOHN ALUMINUM AND BRASS CORPORATION, DETROIT, MICHIGAN
GENERAL OFFICES—LAFAYETTE BUILDING
Designers and Fabricators—ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT-TYPE BEARINGS

Wells SAWS
THE SIGN OF SERVICE

No. 9
General Foundry Saw.

No. 20
Designed for cutting risers off propeller blades.

No. 5
Ideal tool room size.

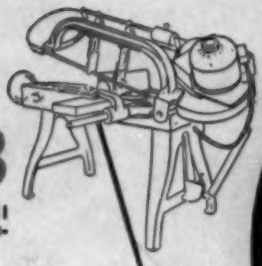


Wells

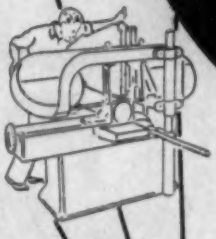
Fast-Accurate-Rugged

METAL CUTTING BAND SAWS

No. 8
Popular all around production Saw.



No. 12
Heavy duty production Saw.



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Available at all times.

STOCK STANDS
Indispensable item for your shop.

WELLS METAL CUTTING BAND SAWS are engineered and designed for dependable long service in metal cutting efficiency, meeting the exacting requirements of present day demands on industry.

Whatever your metal cutting jobs are, call your distributor or write direct.

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WELLS MANUFACTURING CORPORATION

Wells **METAL CUTTING BAND SAWS**

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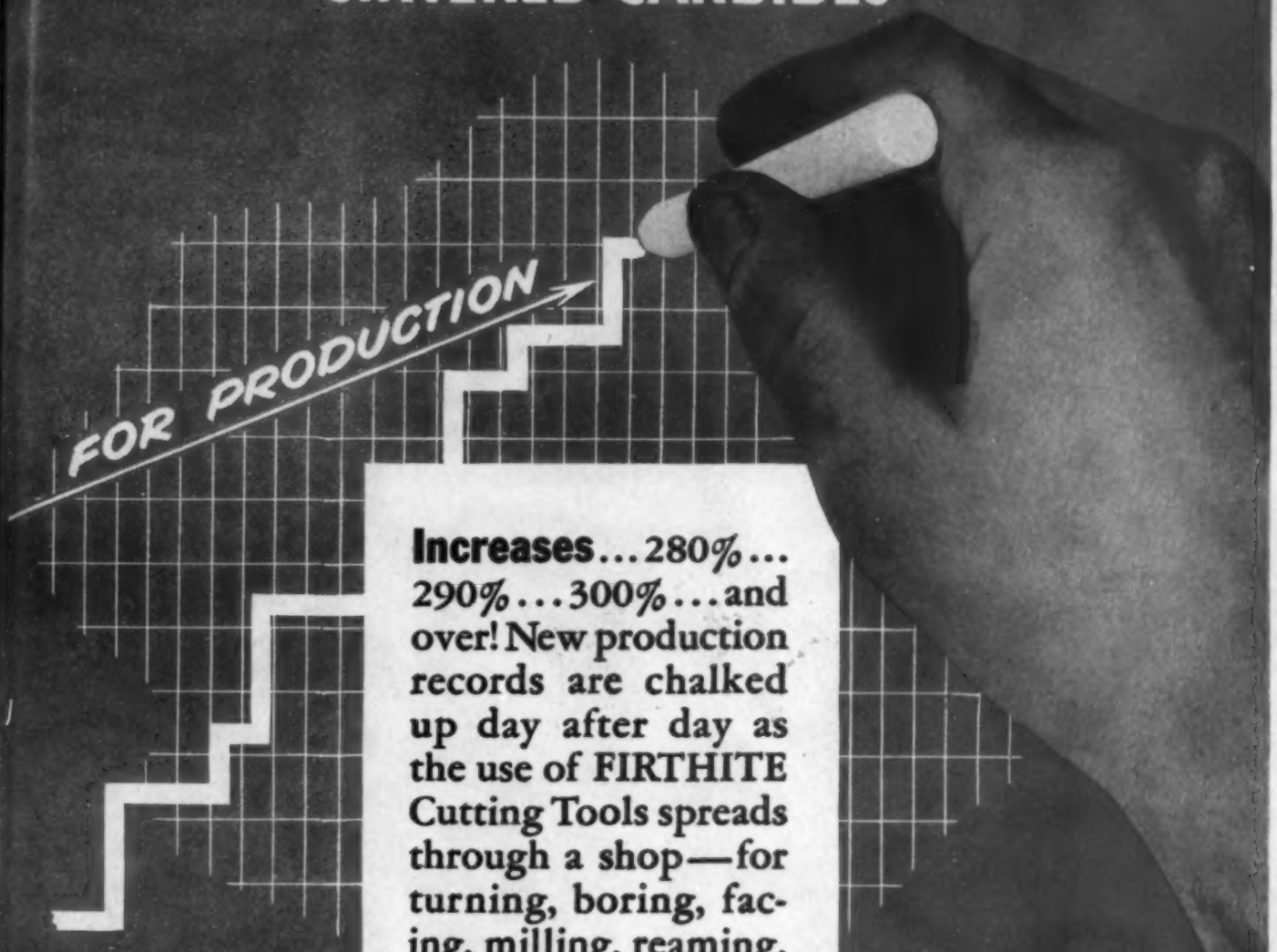
FIRTHITE

SINTERED CARBIDES



Increases...280%... 290%...300%...and over! New production records are chalked up day after day as the use of FIRTHITE Cutting Tools spreads through a shop—for turning, boring, facing, milling, reaming.

FIRTHITE Sintered Carbides cut metals and non-metallic materials at higher speeds, faster feeds. FIRTHITE Engineers are at your service.

ARMY E NAVY

Firth-Sterling

STEEL COMPANY

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BIGGEST NEWS IN AC WELDING!

P&H ARC WELDERS

Heavy Duty Industrial Models (shown above) are offered in capacities from 50 to 1200 amperes. Intermittent Duty Models range from 20 to 335 amperes capacity.

If your need for welding equipment is urgent, immediate deliveries can be made on proper priority. See your nearest P&H representative; write or wire us.

ARMY E NAVY

Engineered for modern production work, the new P&H AC welders provide a continuous concentrated arc which makes it easy to control the molten pool of weld metal. They simplify intricate, close-corner welding, enabling you to save time and reduce welding costs.

The complete line includes a wide range of capacities of both Heavy-Duty and Intermittent-Duty Industrial Models. All carry the WSR (Welding Service Range) ratings which certify the usable welding current of each machine on the basis of actual delivered output from minimum to maximum capacity. Early deliveries are possible for essential industries. Write for literature.

General Offices:
4411 West National Avenue, Milwaukee, Wisconsin

HARNISCHFEGER
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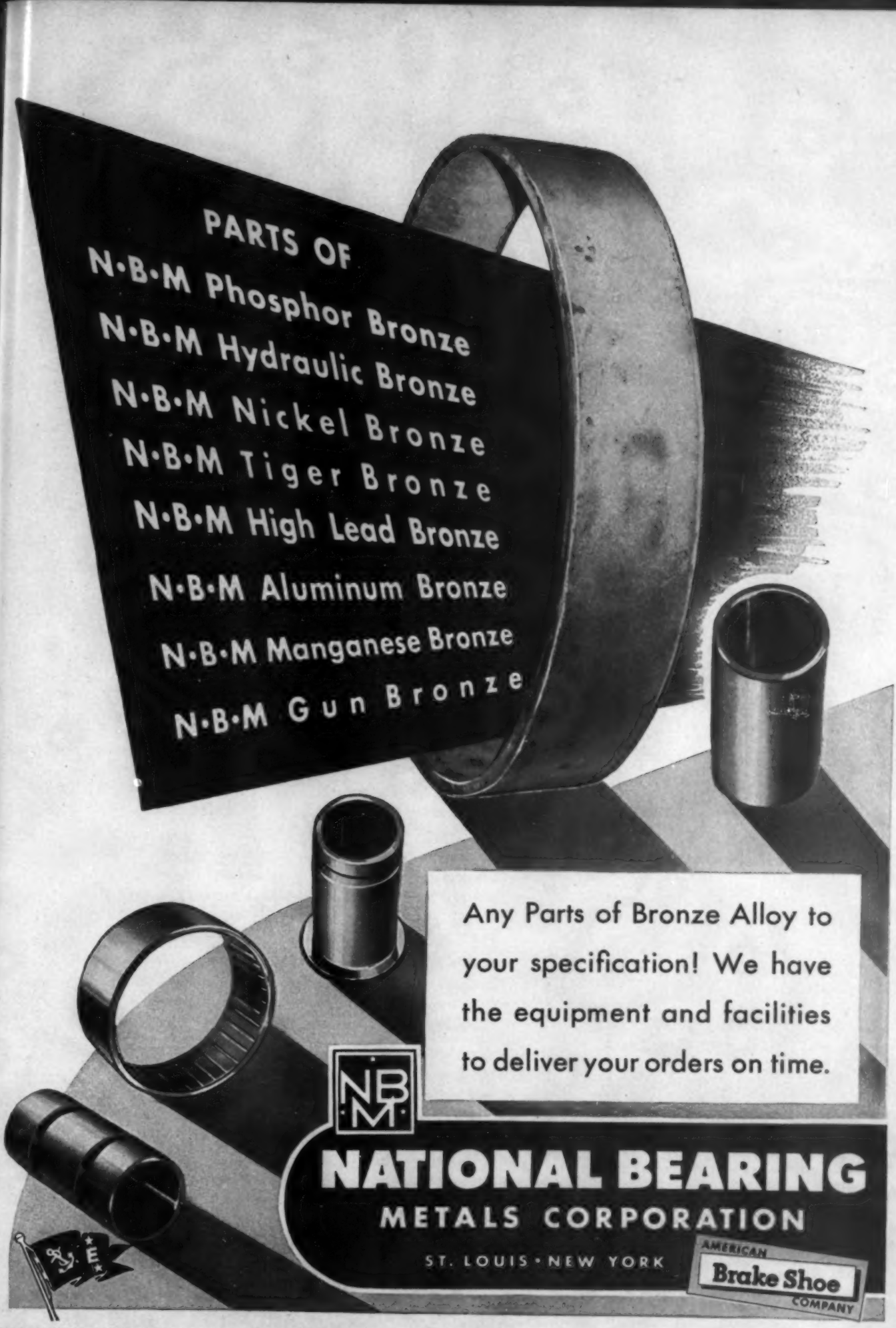
ARC WELDERS • EXCAVATORS • ELECTRIC CRANES P&H MOTORS • HOISTS • WELDING ELECTRODES



PLANTS IN: ST. LOUIS, MO. • PITTSBURGH, PA. • MEADVILLE, PA. • JERSEY CITY, N. J. • PORTSMOUTH, VA. • ST. PAUL, MINN. • CHICAGO, ILL

Hydraulic feed and rapid traverse move the cutter head transversely on hardened and ground steel ways. A variety of work fixtures can be mounted on the bed.

CROSS SPECIAL *Floor Type Miller*

Cross' development of a Floor Type Miller with traversing head is of particular importance to the manufacturer who was forced to start quickly and at any expense by improvising with standard machine tools. With exceptional range and flexibility, it is constructed to handle a variety of work with little time required for changeover and set-up. The bed is arranged to receive many different kinds of holding fixtures—vertical, horizontal, angular, indexing, compound, rotary feed, rise and fall. The full automatic operating cycle is controlled from a central push button station and it can be set to automatically perform plain face milling, contour milling, profile milling, slotting, rotary milling, and operations requiring the cutter to traverse an irregular path.

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A review of current practice will reveal many opportunities to consolidate operations and put them on an automatic basis with improved accuracy and reduced manpower. Cross engineers are prepared to assist you in applying special machinery to your manufacturing problems.

CROSS GEAR & MACHINE CO.

Established in 1898

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S-2

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Parts are fed to this assembly line and the completed 12-cylinder motors are hauled away by the overhead Tramrail route. The hoist is two tons capacity.

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All-welded tanker, constructed in 90 days, slides down the ways. Page 31.

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STEEL

The Magazine of Metalworking and Metalproducing

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Construction program stepped up for 1944

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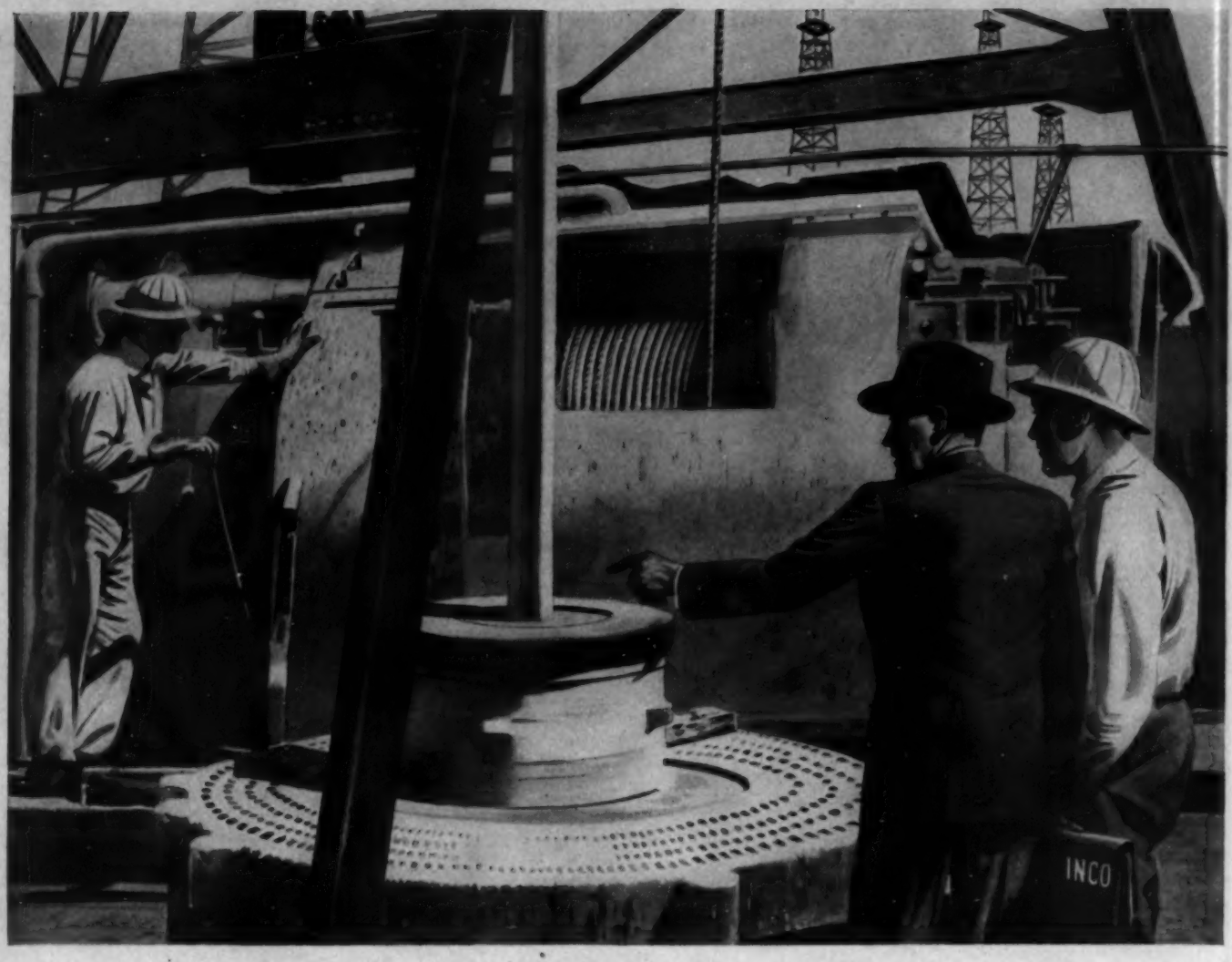

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STEEL
August 30, 1943

What Price Renegotiation?

War contract renegotiation, which subject ranks high on the list of problems to be tackled by Congress in September, has become unnecessarily involved. Anyone who reads carefully the arguments of the principals in this debate is forced to conclude that they have become so engrossed in detail that they are incapable of evaluating the broader issues at stake.

In the first place, should contracts be renegotiated? The right answer, we believe, is that a few should be but that a majority should not be.

Pearl Harbor caused us to speed our war program. It is conceivable that in the urge to get going we drafted contracts hurriedly. We underestimated the effects of repetitive operations on production costs. We underrated the American capacity for ingenuity, resourcefulness and simplification. We surprised our best experts by doing better than they thought we could do. Unquestionably there was justification in readjusting early contracts to compensate for our under estimates.

But as time went on and as we learned from experience, we should have been evolving a technique in original contract negotiation which should have eliminated the necessity of renegotiation except in a few unusual instances. Instead of working steadily toward the ideal of a firm contract, we continued to temporize with loosely drawn "scraps of paper." The result is that today we are in an awful mess.

Moreover, we have gotten so far away from the original purpose of a contract that we are considering almost every factor except the one that counts. We are arguing about prewar profits, postwar reserves, ability to pay, etc., etc., instead of fair pay for service rendered, which should be the primary consideration.

Also, we seem to have overlooked entirely the psychological effect of renegotiation. It is about the most pro-Hitler device that could be conceived. It discourages efficiency in management and operation. It encourages waste, shiftlessness and boondoggling. It promotes complacency at a time when we should be fighting complacency vigorously.

One argument advanced for renegotiation is that it saves money and prevents profiteering. We venture the opinion that except in some exceptional cases early in the war and in cases of voluntary renegotiation on the part of contractors, renegotiation has not saved money or prevented profiteering to the extent that these objectives would have been served if we had had no renegotiation and had relied upon sound tax laws to take care of excessive profits.

PIPELINE "KNOW HOW": About 4 o'clock Saturday afternoon, Aug. 21, oil was drawn from a tap near Linden, N. J., into a 5-gal. glass jug. The fluid was transferred from this jug into numerous small glass vials for distribution as souvenirs. Recipients of these vials prized them because each contained a few ounces of the first oil to flow through "Big Inch," the government's new pipeline from Texas to the north Atlantic seaboard.

Back of the simple ceremony at Linden is a typical American achievement. Steel had to be diverted from the direct needs of the war program. Steelmaking, mill and equipment building capacity had to be scheduled for the big job of making pipe, accessories, pumps, etc. for a 1400-mile line of 24-inch seamless steel pipe. After material and equipment were supplied there still remained the task of digging the trench, welding the pipe, coating it for protection against corrosion, lowering it into place, installing valves, and tying it in with 29 pump stations and several auxiliary distributing lines.

In spite of numerous handicaps, "Big Inch" was

(OVER)

put down at an average rate of 5 miles of pipe per day. The record speaks volumes for the "know how" of pipeline construction which Americans have been developing in recent years and which was applied to good advantage in the "Big Inch" emergency. —p. 64

• • •

WHITE COAL AND IRON: Hydroelectric power is prominently mentioned in current news. It is associated with many wartime problems in the production of light metals, wood pulp, ferroalloys and other essentials. In the Pacific states, and particularly in the Northwest, local citizens are counting upon the availability of cheap electricity to attract many industries to the region after the war. In Chile, plans for a steelworks to produce 100,000 metric tons of steel annually contemplate the erection of two electric blast furnaces of the Swedish Tysland-Hole type to utilize the low cost hydroelectric power available at the plant site.

Thus far, the use of electricity for iron smelting has advanced more in the Scandinavian countries, Italy and Japan than in the United States, Great Britain, France and Germany, where pig iron has been produced economically by orthodox methods. If and when economic conditions call for the development of electric smelting in this country, the Pacific Northwest would seem to be a favored spot for the experiment. —pp. 56, 58

• • •

WAR'S EFFECT ON STEEL: American Iron and Steel Institute rates the nation's steel ingot producing capacity as of July 1, 1943 at 90,881,000 tons annually and its blast furnace capacity as of the same date at 64,500,000 tons. Both figures represent moderate gains from the capacities of Jan. 1, 1943, and marked increases from the Jan. 1, 1940, levels. The goal of 96,000,000 tons of steelmaking capacity, originally set for July 1, 1943, will not be attained until sometime next year.

The institute also has issued the detailed breakdown of the classification of billings of steel products by principal consuming groups for 1942. These figures support the general statement on the distribution of steel for 1942 issued by the institute earlier in the year and presented on page 57 of the April 19, 1943, issue of STEEL. Study of the tabulation of shipments shows how wartime activities—notably shipbuilding—have altered the usual pattern of distribution. —pp. 34, 36

UNLOADING UNCLE SAM: Everytime we hear that a government operation has been turned over to private interests, we feel that at least one potential headache has been removed from the nation's postwar adjustment problem.

During the past two weeks coal mine properties of 58 companies were turned back to their rightful owners and operators. The Rossford, O., Ordnance Depot was taken over from the Army by the Harvester War Depot, Inc., a wholly-owned subsidiary of the International Harvester Co.

These and other transfers of recent date encourage Americans to feel that their government is not too anxious to encroach upon private enterprise. Nevertheless, there are some people in Washington who would like to see the government run everything and the fact remains that Uncle Sam still is running hundreds of businesses which could be managed much more efficiently by private operators.

We have a long way to go and the road will be rough, but we are moving in the right direction. —pp. 33, 57

• • •

FLUIDITY IN MANPOWER: Manpower Commissioner McNutt says that the military services are going to increase their personnel from 9,300,000 to 11,300,000 by July 1, 1944, and that this drain, coupled with other factors, will necessitate moving 2,600,000 persons from less essential to more essential jobs between now and July 1 next year.

There are so many variables in the manpower situation that it is not easy to predict just what this will mean to industry's employment problem. Superficially, it undoubtedly means that present shortages will be intensified. On the other hand, it is known that manpower scarcity is not uniformly distributed over the nation. Cutbacks, cancellations, etc. will cause temporary surpluses in spots.

Two things might relieve the threatened tight situation. One would be greater fluidity in labor—ability to shift manpower quickly to where it is needed most. Second would be to weed out about a million persons from government civilian payrolls where they are performing no currently essential service. —p. 37

E. L. Shaner

EDITOR-IN-CHIEF

Here 7-in. cylinders are turned inside out and reduced to 6 in. diameter.

Cylinders, drawn to 4½-in. diameter by 17 in. deep through a ring die, are conveyed from the press pit to the finishing floor.

4½" x 17" Steel Cylinders— *Drawn from Inland Sheets*

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These cylinder forming operations, like many other difficult war jobs, are proof of the uniformity and high quality of Inland flat rolled steel products—products that are being used 100% for Victory.

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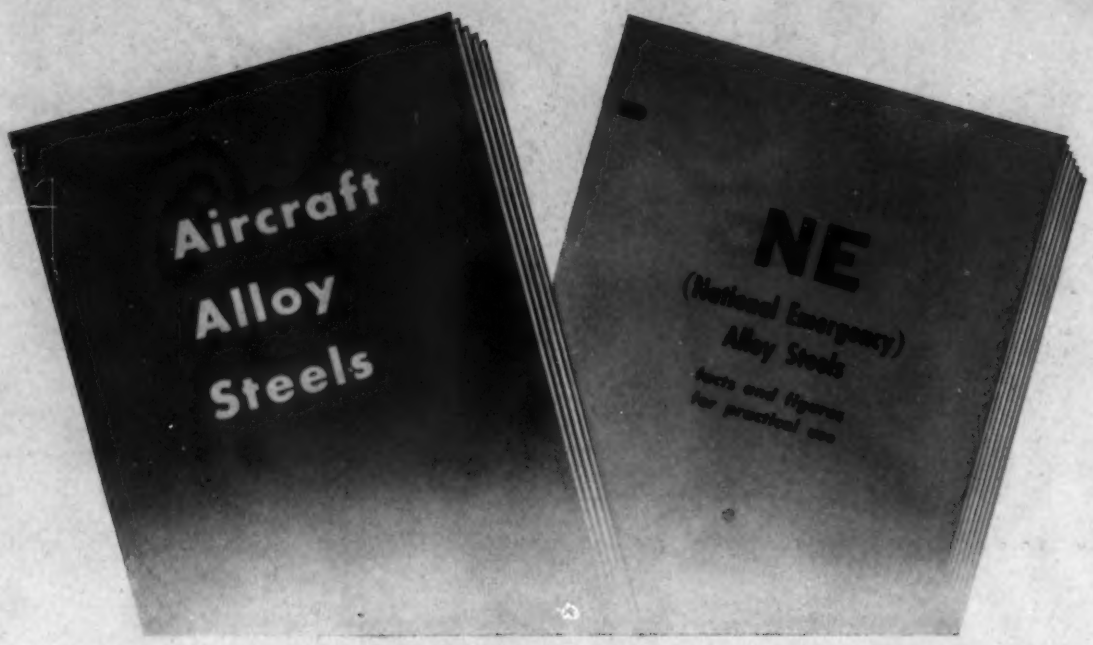

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RYERSON STEEL-SERVICE

Yards Get No Respite; 1944 Program Stepped Up

Projected schedule for next year calls for in excess of 20,000,000 deadweight merchant tonnage. . . Bulk of construction continues centered on mass output of slow-moving Liberties. . . 500 fast vessels planned

MERCHANT shipbuilding program for 1944 calling for in excess of 20,000,000 deadweight, or carrying capacity, tonnage was disclosed last week by a spokesman for the Maritime Commission.

At the same time formal announcement was made of a combined American-British-Canadian Shipbuilding Committee to standardize ship designs.

The Maritime Commission spokesman said the combined chiefs of staff had approved a 1944 program in excess of 20,000,000 deadweight, or carrying capacity, tonnage, the new vessels to include 500 fast ships. He did not say how much more than 20,000,000 tons was projected.

While the actual number of ships to be built was not stated, it recently was reported the total program will run between 1800 and 2000 vessels. At the same time, it was said all the speedy C-type cargo carriers planned for the year will be built, which with the new Victory-type will bring the total of fast cargo ships in the program to more than 500.

The bulk of the country's shipbuilding activity, however, it is indicated, will continue to be concentrated on the slow-moving, mass-built Liberty ship, output of which has permitted shipbuilders to smash all shipbuilding records.

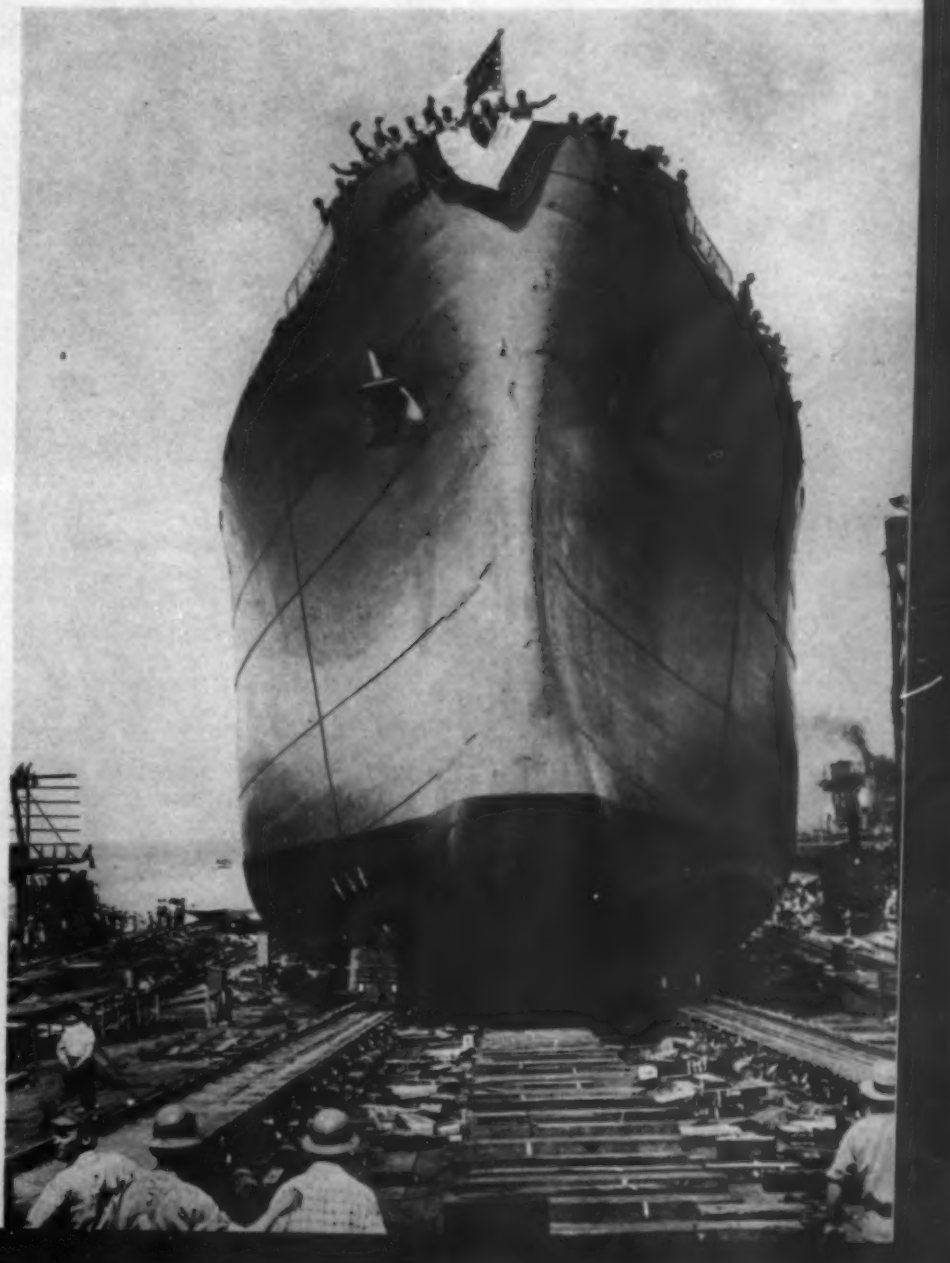
In the first seven months of this year American shipyards delivered into service 1046 new merchant vessels, aggregating 10,485,500 deadweight tons, according to the Maritime Commission.

During the seven-month period ship construction has been stepping up at a very rapid rate. During the period total tonnage passed the halfway point in the projected schedule of more than 19,000,000 deadweight tons of merchant ships and special craft for the calendar year. This record production was achieved in the face of changes in program such as diversion of shipbuilding capacity from Liberty ships to tankers, and also difficulties encountered in obtaining materials.

In informed quarters it is said the 1944 program represents a compromise between the Maritime Commission and the War Production Board. It is understood the commission started out with plans for large-scale, rapid conversion of Liberty-ship yards to Victory-ship production, while the War Production Board argued for a less drastic change on the grounds abrupt conversion would cause a dangerous drop in total launchings and a heavier outlay for each vessel in materials, manpower and construction time.

As a result of the compromise, it is said, a few shipbuilders who had expected to construct Victory ships will have to go on making Liberties. However, only a few yards will be affected. At the same time it was indicated the Victory ship construction program may be increased as gears and turbines become available.

In shipbuilding quarters it is pointed out that the construction program for



This all-welded tanker, constructed in 90 days, slides down the ways at the Welding Shipyards Inc. at Norfolk. Shipyards are expected to top the 19,000,000 ton goal set for 1943 and are being called upon to produce more than 20,000,000 tons in 1944. Acme photo

1944 is about twice as great as the entire Merchant Marine on Jan. 1, 1941. Completion of next year's schedule will mean that 50,000,000 tons, or about 5000 ships, will have been built since the start of the shipbuilding program in 1938. This is equal to the five largest maritime fleets in the world in January 1941—those of Great Britain, the United States, Japan, Germany and Norway.

In recent months some government officials have questioned whether war demands would require such a great volume of shipping as is projected in view of the sharp decline in losses from U-boat attacks, limited port facilities in the war zones and shortage of seamen.

In reply Maritime officials point out the chiefs of staff have approved preparation of materials and facilities for the huge 1944 program but state completion of it depends upon developments in the war. However, as far as the Maritime Commission is concerned it must be assumed that all projected ships will be needed.

British-American-Canadian Combined Committee on Standardization of Ship Design was announced publicly for the first time by Donald M. Nelson, chairman of the War Production Board, last week, it being described as "the first attempt in history at international coordination in shipbuilding."

Standardize Propulsion Machinery

Among the committee's achievements, Mr. Nelson said, was standardization of ship propulsion machinery which has freed enough manufacturing capacity to assure the turning out geared turbines for 350 of the new Victory ships for 1944.

The 1944 construction schedule disclosed by the commission calls for delivery of the new-type Victory ships and about 200 of the superior fast merchantmen of the C-type. Most of the other vessels will be the Liberty freighters.

Much of the credit for making available the geared turbines for the new Victory ships is accorded by Maritime Commission officials to the American-British-Canadian committee.

The first task of this committee, which was organized some months ago, was turbines and the necessary gears for Victory ships just when the entire capacity output of manufacturers was going into naval vessels and C-ships. The committee brought producers, shipbuilders and governmental officials together and managed to reduce the 27 types of turbines being manufactured to nine. Types of gears were reduced from 77 to 17.

Production of propulsion machinery not only was speeded, but also it has been possible to develop standards to the end any geared turbine produced by any of the five turbine manufacturers and four gear manufacturers for the Victory ship program will fit on the same mounting and have the same type of connections. Thus, no Victory shipbuilder will have to delay production because a turbine fails to arrive on time; he can use a turbine available from any of the other manufacturers.

The committee found also that the Army, the Navy, the Maritime Commission and other federal agencies were building 23 different types of steel tow boats. The committee reduced this to seven types. Similarly, the six types of escort vessels being produced in this country are being cut to one.

Mr. Nelson said this simplification and standardization, together with the subsequent agreement on a simple design for Victory-ship equipment, saved so much time, materials and new facilities that geared turbines became available for as many as 350 of the Victory ships to be built next year, representing about 3,500,000 tons.

By the same means it was found possible to reduce the types of turbo-generator sets for power and lighting of ships. It was discovered, too, that steel tugboat types could be cut and the vessels still amply serve the same purposes.

All these were accomplishments of the committee in its first six months, and Mr. Nelson pointed to them as indicating "what further substantial economies in capital investment, materials and time may be expected in the future from this sort of co-operation."

MORE TANKERS

American shipyards delivered approximately 40 per cent more oil tankers during the first seven months of this year than during the entire year of 1942. Through July of this year a total of 88 tankers aggregating 1,013,000 deadweight tons were delivered.

Increase in tanker production was attributed in part to standardization of design. Other factors were mass production and prefabrication methods plus the all-out effort by workers and management.

Future schedules call for a still further increase in the production of T2-type tankers. While 82 of the craft had been delivered through July, 1943, delivery schedules call for a total of 424 more of this type by the end of 1944.

War Goods To Be Rushed to Fronts

Ordnance officials study problems of supplying materiel to 70 theatres of operations in adequate and continuous flow

MEANS for speeding the flow of war materiel to the fighting fronts was the subject of a two-day conference at the Palmer House, Chicago, Aug. 25-26, between top ordnance officials and the commanding officers of ordnance depots. Conference was attended by 11 generals, 49 colonels and 10 lieutenants colonels, including Maj. Gen. Levin H. Campbell Jr., Chief of Ordnance, and Brig. Gen. Julian S. Hatcher, chief, field service division, Office of Chief of Ordnance, Washington.

In view of the momentous decisions made at Quebec, the Ordnance Department is ready to go all out in supplying fighting equipment for overseas forces, General Campbell stated in a press conference. For this reason, he asserted, it was deemed wise to acquaint all commanders of the Ordnance Field Service Department with the problems of other depots in the supply of tanks, vehicles, ammunition and guns.

All the vast supply procured by the Ordnance Department must flow through the field service depots to combat troops no matter where they are in 70 different theaters of operations, he continued.

Ordnance Department recently turned over five of its depots to operation by civilian companies, and negotiations are nearing completion for a sixth transfer.

Depots now under civilian operation are the Milan depot, Milan, Tenn., by Procter & Gamble Co.; Ravenna Ordnance Center, Ravenna, O., by Atlas Powder Co.; Anniston depot, Anniston, Ala., by Chrysler Corp.; Lordstown depot, Warren, O., by Sears, Roebuck & Co., and Rossford depot, Toledo, O., by International Harvester Co.

Predicts No Radical Changes in Automobiles

Americans should expect no radical innovations iu such items as automobiles when production is resumed after the war, according to Fred Zeder, vice chairman of the Chrysler Corp. He predicted manufacturers would rush into production as soon as possible to fill waiting consumer demands and that models would be about the same as those before production was stopped.

Mr. Zeder's observation was made dur-

ing a visit to Cleveland as a member of the National Inventors' Council meeting in that city, and which inspected the airplane engine research laboratory of the National Advisory Committee for Aeronautics, the Cleveland Diesel Engine Division of General Motors Corp., and General Electric Co.'s Nela Park.

Members of the council termed their visit to the three plants a "revelation." Lieut. Col. L. B. Lent, Army Air Force, described the N. A. C. A. laboratory as an invaluable testing ground for aircraft engines.

Although Colonel Lent was not permitted to list detailed accomplishments of the laboratory, he indicated one of the more important was the stepping up of horsepower of fighter plane engines.

Colonel Lent and Rear Admiral H. G. Bowen expressed the opinion that the inventors council, by channeling inventions to the appropriate military officials, had aided the war program incalculably and that the military efficiency of the United States could be maintained at a higher level in peacetime if the system were retained.

Present, Past and Pending

■ JULY MACHINE TOOL SHIPMENTS DECLINE SLIGHTLY

WASHINGTON—Machine tool shipments in July amounted to $97,428,000, a decline of 1.4 per cent from June. Net new orders were $28,795,000. At July rate of shipments, builders' backlogs will be eliminated in 4½ months.

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■ GOVERNMENT SPENDS $25 BILLION FOR WAR PLANTS

WASHINGTON—Twenty-five billion dollars has been expended by the government for construction of new plant facilities for the prosecution of the war, according to Secretary of Commerce Jesse Jones.

• • •

■ NEW SYNTHETIC TIRE EXPANSION PROGRAM IN MAKING

WASHINGTON—Rubber Director William M. Jeffers has submitted tentative proposals for a $95 million expansion of synthetic rubber tire production facilities.

• • •

■ COST OF LIVING DECLINES IN JULY

NEW YORK—Living costs in the United States declined 1.2 per cent during July, according to the National Industrial Conference Board.

• • •

■ INDUSTRY LOOKS TO NEW POSTWAR FIELDS

NEW YORK—One company in five plans to invade new fields after the war, according to a survey made by McKinsey & Co., management consultants.

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■ FARM EQUIPMENT INSTITUTE CANCELS CONVENTION

CHICAGO—Farm Equipment Institute has cancelled its annual convention, originally scheduled to be held here Oct. 12-13. Action was promoted by desire to cooperate with Office of Defense Transportation in holding convention travel to minimum.

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■ MORE STEEL PLATES ASKED FOR FOURTH QUARTER

WASHINGTON—War Production Board steel officials are being asked for more steel plates for fourth quarter for the Maritime Commission, Navy and the railroads. Beginning in October, it is understood, 50,000 additional tons will be allocated; 20,000 tons will come from expanded capacity and the remainder will be obtained by reducing other quotas.

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■ SCRAP INDUSTRY'S LABOR SHORTAGE ACUTE

WASHINGTON—Scrap industry representatives have informed the War Manpower Commission of a growing labor shortage and asked that safeguards be provided which will allow dealers to retain their present forces. Many have only 33 to 60 per cent of their 1940 labor strength. Complicating the shortage is a proposal to launch a new scrap collection campaign this fall.

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■ RECEIVE NORTH AFRICAN BATTLE SCRAP

RICHMOND, VA.—Two carloads of war scrap from North Africa—wrecked planes, tank parts, helmets and shell—have arrived at the Smith Junk & Salvage Co. here.

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■ SEPT. 30 DEADLINE FOR IDLE STEEL REPORTS

PITTSBURGH—Steel Recovery Corp. will continue to accept reports on inventories of idle steel only until Sept. 30. Reports postmarked after that date will not be processed and the steel will not be eligible for the government's special "higher-than-scrap" prices.

Steelmakers Win Fuel Priorities

Industry's bituminous needs must be filled first, Ickes rules. . . . Upper lakes area consumer must be served next

PRIORITY on bituminous coal shipments was given to the iron and steel producers and other vital metallurgical users last week by Solid Fuel Administrator Harold L. Ickes.

Secondary priorities were given to consumers in the Great Lakes district to allow these consumers to build up stocks before navigation on the lakes is closed by winter weather.

Increased requirements of the by-product coke industry, an integral part of steel manufacture, coupled with deficiencies in coal output resulting from strikes and manpower losses have made supplying of metallurgical coal a prime problem of the industry. Late opening of the lake navigation season, with losses caused by the coal mine strikes, have put shipments to the upper lakes behind schedule.

Producers now have been authorized to reduce shipments to customers not in the upper lakes consuming district until orders from these customers are filled.

Where producers' commitments are less than customers' requirements, the solid fuel administrator may apportion the deficiency to be filled among the various districts. Bituminous coal advisory boards under the supervision of the solid fuel administration will ascertain which producers in their districts shall fill the deficiency quotas.

After filling the requirements under the new orders, producers will be directed to prorate their remaining tonnage among their other customers, except where customers with adequate stocks agree to accept less coal.

Mines of 58 Coal Firms Returned to Owners

Mines of 58 coal companies last week were returned to private control by Secretary of Interior Harold L. Ickes who has been operating the mines since they were seized by the government.

The mines were returned in accordance with the Smith-Connally antistrike act requirement that property seized by the government be returned within 60 days after restoration of "productive efficiency."

Ten Million Tons Added During Three-Year Expansion Program

Electric furnace capacity now two and a half times greater than in 1940. . . Most projects to be completed in 1943, but few will be delayed until early in 1944

AMERICAN steel producing capacity has increased to a new peak of 90,881,000 tons annually, according to the American Iron and Steel Institute.

During the past three years, total annual capacity has been enlarged by nearly 10,000,000 tons to meet the expanded needs of steel for the war program. When the present expansion program is completed, capacity will approximate 96,000,000 tons a year.

Original schedule called for completion of the program by July 1 of this year. The relatively low priority ratings which were assigned to the program delayed the receipt of necessary materials and equipment and caused the program to be set back.

Rated capacity as of July 1 shows open-hearth furnace capacity to be 79,867,000 tons, about 700,000 tons more than the total at the beginning of the year.

Electric furnace capacity is rated at 4,936,000 tons, nearly 400,000 tons above the figure at the beginning of the year and more than two and a half times the electric furnace capacity available to consumers of steel three years ago.

Bessemer and crucible capacity have fluctuated relatively little in recent years and are rated at 6,074,000 and 3800 tons a year respectively.

Blast furnace capacity as of July 1 was rated at 64,500,000 tons a year, 500,000 tons more than at the beginning of the year and 9,000,000 tons more than in 1940.

Magnesium Castings Output Triples Pre-War Rate

War Production Board revealed last week that production of magnesium castings is three times greater than production at the time of the Pearl Harbor attack. Not included in the totals are incendiary bomb magnesium castings which also have shown large production increases.

Sand castings showed the largest poundage increase from less than 1,500,000 in November, 1941, to over 4,500,000 pounds per month in the spring of this year. Permanent mold castings reached a peak of 356,000 pounds and die castings a peak of 274,000 pounds in May of this year, increases of more than 1400 and 400 per cent respectively over pre-war production.

June Scrap Stocks Show Slight Gain Over May

Domestic stocks of steel and iron scrap at consumers', suppliers' and producers' plants at the end of June were approximately 6,916,000 gross tons, a slight increase over the 6,905,000 tons reported as of May 31, 1943, according to the Bureau of Mines, Department of Interior.

WPB Denies CIO Charges Surplus Ingots Not Promptly Processed

SURPLUS steel ingot capacity arising from completion of new open hearths prior to completion of rolling mills has been utilized in the best interests of the war program, Operations Vice Chairman H. G. Batcheller, War Production Board, said last week in a telegram to Eugene Maurice, United Steelworkers of America, CIO, in response to a complaint by Mr. Maurice that Bethlehem Steel Co. was avoiding processing of surplus ingots produced by another company because of the freight charges involved.

Following conferences with WPB officials, Mr. Maurice agreed the best possible use of steel melting capacity has been made by the War Production Board, Mr. Batcheller said. Mr. Maurice also expressed approval of plans formulated by the Steel Division of WPB to direct movement of any surplus ingots that may become available in the future from the producing mill to the Bethlehem company's Johnstown mill and other finishing mills where they may be finished into end products most needed in the war effort.

In his telegram Mr. Batcheller said: "Mr. Nelson has instructed me to investigate the possible increase in supply of steel vitally needed for the war program through the rolling of ingots which can be produced by Carnegie in excess of their finishing capacity by Beth-

FIRST WEST COAST PLATE: Here is the first plate to be rolled at Henry J. Kaiser's $100,000,000 Fontana, Calif., steel mill. The mill, which started operations Aug. 16, will produce 300 tons of plates every eight hours, to be used for the construction of merchant ships. NEA photo

lehem at the Johnstown plant where surplus finishing capacity exists, and your complaint that Bethlehem is avoiding the processing of such surplus ingots because of freight charges involved, all as referred to in your telegram of Aug. 9.

"You state that such ingots are available at the Homestead plant of Carnegie. This is not the case. Investigation shows that wherever surplus ingot capacity has existed, such as at Kaiser plant in California and Carnegie mill at Homestead, where new open hearths have been completed prior to completion of rolling mill facilities in some plants, such ingots have been utilized in best interests of the war program. Kaiser ingots have been supplied to meet vital requirements of our Allies under Lend-Lease. Ingots produced by Carnegie on new open hearths already completed have been fully utilized by other mills of the United States Steel Corp. or by other steel companies."

War Causes Shifts in Steel Distribution

Sharp shifts in both the type of steel products produced in 1942 and the consuming industries to which they were shipped are revealed in the annual statistical report of the American Iron and Steel Institute recently issued.

Analysis of billings of products to consumers is shown in a table, page 36.

Most sensational increase among steel consuming industries was made by shipbuilders who took 16 per cent of total output. Greatest decline was in the automotive industry which normally in recent years has been the industry's No. 1 customer.

The institute's report, its thirty-first, covers many statistics for the iron and steel industry for 1942 and for Canada and some other countries for 1940 and prior years.

Import and export statistics for 1941 and 1942 are not available but the report includes such data as are available for 1940 and prior years.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Aug. 28	Change	Same Week 1942	Same Week 1941
Pittsburgh	98.5	—1.5	94	100
Chicago	99	+0.5	103	101.5
Eastern Pa.	95	None	95	95.5
Youngstown	98	None	96	98
Wheeling	103	+8	78	93
Cleveland	94.5	+5	99	93
Buffalo	90.5	None	93	93
Birmingham	95	None	95	95
New England	97	None	92	90
Cincinnati	92	—5	91	88
St. Louis	89	None	95.5	98
Detroit	83	—3	89	92
Average	98.5	None	*98	*96.5

*Based on steelmaking capacities as of these dates.

Ingot Output Steady at 98.5%

District rates at Pittsburgh and Wheeling reflect capacity revisions

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week held steady at 98.5 per cent of capacity.

A year ago the national rate was 98 per cent; two years ago it was 96.5 per cent, both based on capacities as of those dates.

Revision of capacity due to new equipment added at Homestead and Duquesne works of Carnegie-Illinois Steel Corp. caused the Pittsburgh district's operating rate to decline 1½ points to 98.5 per cent during the past week. Actual steel tonnage produced was slightly greater than in the preceding week.

Removal of one plant from active status resulted in a sharp upward revision of the Wheeling district rate during the latest period. This plant has not been operated as a steel producer since before the war, but has been carried as potential capacity in figuring the district rate. Its removal caused an increase in the Wheeling district's steel rate of 8 points to 103 per cent of capacity.

All blast furnaces in the Pittsburgh district are now in operation with the resumption of melting at "I" furnace, Edgar Thomson works, Carnegie-Illinois Steel Corp., recently. Within the next month two additional new furnaces are expected to begin operation.

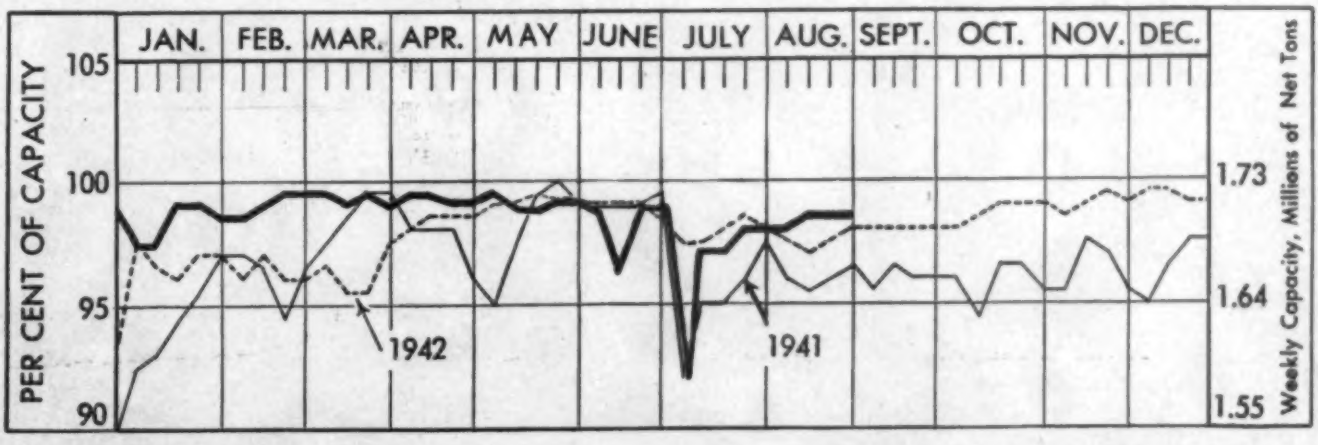
Inland Steel Co. reports that five blast furnaces at its Indiana Harbor plant have maintained uninterrupted production for more than three years. This is believed to be a group continuous operational record.

Details of July Pig Iron Production

District	Pig iron	Ferro, spiegel	Total July	Total Year to date	Per cent capacity
Eastern	987,705	17,690	1,005,395	6,714,806	92.2
Pittsburgh-Youngstown	1,967,099	17,428	1,984,527	14,550,170	91.0
Cleveland-Detroit	492,609	.....	492,609	3,553,716	94.9
Chicago	1,138,044	.....	1,138,044	7,590,453	102.6
Southern	301,277	15,293	316,570	2,428,852	84.4
Western	85,600	.....	85,600	528,191	89.0
Total	4,972,334	50,411	5,022,745	35,366,188	93.5

American Iron and Steel Institute. Companies included above during 1942 represented 99.8 per cent of total blast furnace production.

COMPARATIVE STEEL INGOT OPERATIONS



ANALYSIS OF STEEL PRODUCT DISTRIBUTION IN 1942

(Source: American Iron and Steel Institute. All figures in Net Tons)

Industries	Ingots, Blooms, Billets, Slabs, Tube Rounds & Sheet and Tin Bars (1)	Structural Shapes and Sheet Piling (2)	Plates (Universal and Sheared) (3)	Rails: Over 60 lbs. (4)	Rails: All Other (5)	Tie Plates and Track Accessories including Track Spikes (6)	Hot Rolled Bars: Carbon including Hoops and Bands (7)	Hot Rolled Bars: Concrete Reinforcing (8)	Hot Rolled Bars: Alloy (9)	Cold Finished Bars (Carbon and Alloy) (10)	Pipe and Tubes (11)	Wire Rods (12)	Wire and Wire Products including Fence Posts (13)	Black Plate (14)	Tin and Terne Plate (Hot Rolled and Cold Reduced) (15)	Industries
1. Steel Converting and Processing Industries																1.
(a) Wire drawers and wire product mfrs.	56,003	.....	.....	.....	.....	.....	6,748	.....	5,506	2,109	7,328	487,854	326,791	8	24	(a)
(b) Bolt, nut and rivet manufacturers	75,302	.....	1,040	.....	.....	.....	574,965	.....	12,022	59,963	937	271,368	153,765	384	.....	(b)
(c) Forging manufacturers	740,143	165	10,116	.....	.....	.....	261,020	.....	266,342	6,837	3,367	3,722	3,047	.....	.....	(c)
(d) All other steel plants and foundries	1,782,225	25,622	186,063	875	2,925	44,383	820,827	49,875	99,026	7,438	82,604	52,418	53,183	288	1,074	(d)
Total	2,654,273	25,787	197,219	875	2,925	44,383	1,863,560	49,875	382,896	76,349	94,236	765,362	536,786	650	1,098	Total
2. Jobbers, Dealers and Distributors																2.
(a) Oil and natural gas industry	325	1,744	4,209	1	28	.....	4,216	474	1,381	3,675	259,375	92	4,169	.....	189	(a)
(b) All other	38,772	408,964	452,373	7,662	11,198	40,660	680,665	185,995	65,737	204,602	1,374,363	8,760	930,935	67,645	20,051	(b)
Total	39,097	410,708	456,582	7,663	11,226	40,660	684,881	186,469	67,118	208,277	1,633,738	8,852	935,104	67,645	20,240	Total
3. Construction Industry																3.
(a) Public (Municipal, State, National)	194	18,663	21,800	1,492	16	411	6,142	72,734	204	73	42,298	2,344	19,623	2,658	1,160	(a)
(b) Highways	285	60,313	35,556	161	8	29	14,234	75,975	615	70	1,932	272	14,607	1,332	266	(b)
(c) Railways	157	23,136	19,851	542	16	12,675	5,719	5,144	22	30	763	155	2,376	649	168	(c)
(d) Automotive and Aircraft	311	230,377	76,606	575	930	38	43,725	82,050	671	283	16,353	5,015	22,150	299	202	(d)
(e) Utilities	834	102,773	79,930	3,433	5,579	2,322	51,395	76,606	550	223	51,242	5,982	20,879	18	50	(e)
(f) Bldg. trim, accessories and builders' hdw.	426	30,914	32,131	30	448	62	37,486	8,048	267	759	25,758	3,390	16,539	1,401	2,592	(f)
(g) All other	29,417	1,749,129	1,208,772	93,853	21,809	36,642	393,330	1,001,695	3,787	2,931	416,956	21,028	567,754	6,964	1,154	(g)
Total	31,624	2,215,307	1,474,535	100,076	28,806	52,232	552,121	1,322,272	6,116	4,359	555,301	38,186	664,928	13,311	5,622	Total
4. Shipbuilding Industry	76,815	1,667,100	6,064,447	1,811	461	590	504,033	55,395	36,443	34,390	260,072	5,133	56,191	.....	638	4.
5. Pressing, Forming and Stamping Industry																5.
(a) Metal furniture and office equipment	492	1,559	3,253	.....	.....	.....	18,733	.....	56	5,993	13,042	4,437	34,379	1,517	479	(a)
(b) Hardware and household equipment	1,577	1,293	17,053	.....	.....	.....	10,070	.....	1,281	7,993	8,600	425	25,567	29,739	8,521	(b)
(c) All other	36,280	29,576	249,161	.....	.....	.....	217,844	.....	94,139	25,619	53,496	36,556	118,032	25,913	19,685	(c)
Total	38,349	32,428	269,467	.....	.....	.....	246,647	.....	95,476	39,305	74,138	41,418	197,978	57,169	28,685	Total
6. Container Industry																6.
(a) Oil and natural gas industry	328	3,132	16,549	.....	.....	39	2,890	.....	139	78	50	.....	918	22,875	26,980	(a)
(b) All other	88	653	23,177	.....	.....	.....	25,603	.....	175	57	802	1,041	92,291	235,910	1,941,471	(b)
Total	416	3,785	39,726	.....	.....	39	28,493	.....	314	135	852	1,041	93,209	258,797	1,968,331	Total
7. Agricultural, Incl. Impl. & Equip. Mfrs.	29,338	23,614	41,127	99	7	16	208,158	566	13,342	22,765	11,197	1,838	25,627	431	616	7.
8. Machinery and Tools																8.
(a) Machinery and tools, not incl. elect. equip.	79,344	172,754	423,647	2,065	5,061	238	307,544	.....	72,560	128,913	103,097	4,579	24,692	246	196	(a)
(b) Electrical machinery and equipment	4,868	23,046	130,058	112	.....	12	65,713	.....	6,928	22,812	149,324	37,173	55,640	812	372	(b)
Total	84,212	195,800	553,705	2,177	5,061	250	373,257	.....	79,488	151,725	252,421	41,752	80,332	1,058	568	Total
9. Automotive and Aircraft Industry	114,363	73,373	181,739	.....	.....	107	266,580	.....	276,747	207,803	104,438	11,881	46,255	1,004	2,769	9.
10. Railroad Industry																10.
(a) All railroads	55,454	88,156	290,781	1,454,993	7,085	605,451	140,804	269	4,982	1,191	32,686	1,669	16,628	70	46	(a)
(b) Car and loco. builders and parts mfrs.	30,488	226,737	476,052	4,766	221	1,443	172,172	281	10,349	3,314	17,378	2,293	4,726	190	253	(b)
Total	85,942	314,893	775,833	1,459,759	7,306	606,894	312,976	550	15,331	4,505	50,064	3,962	21,354	260	329	Total
11. Oil, Natural Gas and Mining Industry																11.
(a) Oil and natural gas, incl. pipe lines	7,344	50,025	244,991	218	129	66	41,552	3,139	5,191	1,577	648,981	672	7,519	90	991	(a)
(b) Mining, quarrying and lumbering	1,612	13,582	32,004	8,122	51,996	16,602	38,944	1,614	3,679	843	20,324	667	10,821	37	11	(b)
Total	8,956	72,607	276,995	8,340	52,125	16,668	80,496	4,753	8,870	2,420	669,305	1,339	18,340	127	1,002	Total
12. Miscellaneous Industries and Export	3,356,863	264,934	1,423,155	362,369	11,536	65,879	1,139,147	147,499	809,777	853,803	1,030,848	265,879	669,416	91,016	663,140	12.
13. Total (Items 1 to 12)	6,520,248	5,300,336	11,754,530	1,943,169	119,453	917,718	6,060,349	1,767,381	1,791,918	1,605,836	4,736,610	1,186,643	3,345,520	491,468	2,713,038	13.
14. Less Shipments to Members of the Industry for Conversion or Resale	1,588,544	10,174	141,543	286	97	21,335	541,314	1,536	84,143	1,826	20,549	192,388	31,159	35	78	14.
15. Net Total	4,931,704	5,290,162	11,612,987	1,942,883	119,356	896,383	5,519,035	1,765,845	1,707,775	1,604,010	4,716,061	994,255	3,314,361	1491,433	2,712,960	15.

Industries	Sheets and Strip: Hot Rolled (16)	Sheets and Strip: Cold Reduced (17)	Sheets and Strip: Galvanized (18)	Sheets and Strip: All Other (19)	Tool Steel Bars (20)	Wheels and Axles (21)	Forgings (22)	Steel Castings (23)	Skelp (24)	All Other Steel Products (25)	Total Steel Products (26)	Iron and Brass Products (27)	Grand Total (28)	Less Shipments to Members of the Industry for Conversion into Further Finished Products (29)	Net Total (30)	Pig Iron, Ferromanganese, etc. (31)	Industries
1. Steel Converting and Processing Industries																	1.
(a) Wire drawers and wire product mfrs.	17,967	2,821	.....	.....	632	.....	77	110	.....	385	804,969	43	845,012	233,724	631,288	13,018	(a)
(b) Bolt, nut and rivet manufacturers	16,358	4,086	.....	491	473	.....	7	8	.....	6,576	1,177,719	4,217	1,181,936	134,519	1,047,417	174	(b)
(c) Forging manufacturers	2,106	1,210	.....	38	751	41	17,987	320	.....	972	1,317,386	6,489	1,323,875	161,455	1,162,420	6,070	(c)
(d) All other steel plants and foundries	453,694	25,109	3,815	4,022	3,899	542	12,688	19,908	512,390	4,953	4,249,850	51,412	4,301,262	2,849,424	1,451,838	6,923,050	(d)
Total	490,127	33,225	3,815	4,551	5,757	583	30,764	20,552	512,390	12,886	7,609,924	62,161	7,672,085	3,379,122	4,292,963	6,942,312	Total
2. Jobbers, Dealers and Distributors																	2.
(a) Oil and natural gas industry	1,526	97	1,316	4	52	.....	1,444	18	.....	319	284,648	76	284,724	.....	284,724	12,095	(a)
(b) All other	509,343	247,039	281,886	34,021	16,371	157	3,260	390	381	61,731	5,652,961	24,383	5,677,344	.....	5,677,344	71,383	(b)
Total	510,869	247,136	283,196	34,025	16,423	157	4,704	408	381	62,050	5,937,609	24,459	5,962,068	.....	5,962,068	83,478	Total
3. Construction Industry																	3.
(a) Public (Municipal, State, National)	18,490	2,114	32,244	34	244	50	174	23	.....	991	244,208	1,163	245,371	.....	245,371	210	(a)
(b) Highways	18,982	3,386	47,163	82	76	68	44	85	.....	1,482	277,142	17,143	294,285	.....	294,285	89	(b)
(c) Railways	1,829	484	940	185	100	.....	30	14	.....	185	76,164	69	76,233	.....	76,233	.....	(c)
(d) Automotive and Aircraft	161,438	4,378	9,046	162	26	73	15	47	.....	1,505	656,356	1,288	657,644	.....	657,644	.....	(d)
(e) Utilities	12,667	2,546	531	47	42	3,100	941	395	.....	662	422,427	1,048	423,475	.....	423,475	161	(e)
(f) Bldg. trim, accessories and builders' hardware	158,298	53,371	36,869	1,184	18	.....	16	56	.....	2,892	402,955	883	403,838	.....	403,838	7,464	(f)
(g) All other	604,610	69,228	113,464	1,736	547	2,068	2,633	15,873	.....	36,191	6,491,590	67,802	6,559,392	.....	6,559,392	33,798	(g)
Total	1,066,313	135,507	230,257	3,453	1,053	5,389	3,793	16,393	.....	43,908	8,570,842	89,396	8,660,238	.....	8,660,238	41,722	Total
4. Shipbuilding Industry	201,353	34,196	91,864	2,608	1,060	1,111	180,144	30,328	.....	12,621	9,399,406	40,776	9,440,182	.....	9,440,182	7,910	4.
5. Pressing, Forming and Stamping Industry																	5.
(a) Metal furniture and office equipment	94,061	78,831	11,173	2,751	207	.....	.....	.....	.....	15,817	305,480	8	305,488	.....	305,488	168	(a)
(b) Hardware and household equipment	163,199	144,558	24,320	10,736	182	2	4	305	.....	1,773	457,198	9	457,207	.....	457,207	4,199	(b)
(c) All other	767,317	227,790	17,303	18,789	480	643	2,784	.....	.....	12,726	1,954,133	.....	1,954,133	.....	1,954,133	57	(c)
Total	1,024,577	451,179	52,796	32,276	869	645	2,788	305	.....	30,316	2,716,811	17	2,716,828	.....	2,716,828	4,424	Total
6. Container Industry																	6.
(a) Oil and natural gas industry	311,853	36,944	4,634	1,088	283	.....	8	.....	.....	48,590	497,263	71	497,334	.....	497,334	.....	(a)
(b) All other	578,826	164,076	39,900	4,954	116	.....	6,382	.....	.....	22,822	3,168,353	1	3,168,354	.....	3,168,354	.....	(b)
Total	890,681	251,020	44,534	6,042	399	.....	6,390	.....	.....	71,412	3,665,616	72	3,665,688	.....	3,665,688	.....	Total
7. Agricultural, Incl. Impl. & Equip. Mfrs.	134,471	11,722	32,694	4,311	234	.....	2,883	37	.....	4,951	570,046	377	570,423	.....	570,423	64,364	7.
8. Machinery and Tools																	8.
(a) Machinery and tools, not incl. elect. equip.	108,944	34,526	2,491	4,675	31,128	9,425	45,394	45,815	.....	7,504	1,614,838	8,356	1,623,194	.....	1,623,194	26,842	(a)
(b) Electrical machinery and equipment	266,948	75,089	7,391	48,264	1,503	2,213	12,856	2,562	.....	1,825	915,611	773	916,384	.....	916,384	577	(b)
Total	375,892	109,615	9,882	52,939	32,721	11,638	58,250	48,377	.....	9,329	2,530,449	9,129	2,539,578	.....	2,539,578	27,419	Total
9. Automotive and Aircraft Industry	508,778	240,278	11,986	36,122	5,366	535	20,646	485	.....	1,413	2,121,088	198	2,121,886	.....	2,121,886	52,851	9.
10. Railroad Industry																	10.
(a) All railroads	35,730	2,723	17,600	126	717	174,036	4,991	8,579	.....	26,286	3,070,053	18,199	3,088,252	.....	3,088,252	754	(a)
(b) Car and loco. builders and parts mfrs.	96,534	5,342	5,647	742	449	143,939	4,172	5,161	.....	4,498	1,217,177	12,833	1,230,010	.....	1,230,010	30,378	(b)
Total	132,264	8,065	23,247	868	1,166	317,975	9,163	13,740	.....	30,784	4,287,230	31,032	4,318,262	.....	4,318,262	31,132	Total
11. Oil, Natural Gas and Mining Industry																	11.
(a) Oil and natural gas, incl. pipe lines	54,292	4,843	851	30	210	.....	1,348	549	.....	3,931	1,087,439	2,488	1,089,927	.....	1,089,927	14	(a)
(b) Mining, quarrying and lumbering	11,662	512	2,097	437	1,212	2,008	9,675	912	.....	7,489	236,862	1,460	238,322	.....	238,322	176	(b)
Total	65,954	5,355	2,948	467	1,422	2,008	10,923	1,461	.....	11,420	1,324,301	3,948	1,328,249	.....	1,328,249	190	Total
12. Miscellaneous Industries and Export	1,474,850	846,568	212,374	59,659	36,189	63,114	639,983	13,985	170,441	109,249	14,801,673	46,756	14,848,429	.....	14,848,429	416,263	12.
13. Total (Items 1 to 12)	6,966,129	2,362,868	999,503	237,301	103,350	403,155	979,431	146,071	883,212	400,339	63,535,575	308,321	63,843,896	3,379,122	60,464,774	7,672,065	13.
14. Less Shipments to Members of the Industry for Conversion or Resale	320,572	13,467	1,009	2,564	3,378	196	1,953	192	380,830	329	3,339,406	39,716	3,379,122	.....	.....	.....	14.
15. Net Total	6,645,557	2,349,381	998,564	234,737	99,951	402,959	977,578	145,879	322,392	400,010	60,196,169	268,605	60,464,774	.....	60,464,774	.....	15.

War Jobs To Call 2,600,000 More With Manpower Pinch Tightening

Large-scale transfer of workers from less essential work must be effected over coming year, says McNutt. . . Industry faced with rising production schedules, and men drawn into the military services must be replaced

BETWEEN now and July next year a minimum of 2,600,000 persons must transfer from less essential jobs to munitions production or to jobs in the great number of community services essential to civilian life, Paul V. McNutt, chairman, War Manpower Commission, declared last week.

"It is easy to see why such large-scale transfers must take place," he said. "The military services plan to expand from 9,300,000 to 11,300,000 between July 1943 and July 1944. These men and women will be drawn from war-useful jobs as well as from other occupations. At the same time, as our commitments on the battle fronts multiply, the war industries are required to meet rising schedules of production. They must replace the men drawn into war service, replace those they lose from accidents, normal deaths, retirements, and other kinds of turnover, and add enough skilled workers to assure that production schedules are met within specified periods.

Local Facilities Taxed

"Labor for war production, however, is only part of the story. In places where there is a concentration of war production, a large influx of workers over the last few years has taxed local facilities and services. In these overcrowded areas there are acute shortages of laundry workers, teachers, nurses, doctors, bus and delivery drivers, and others whose services are needed by civilians. These areas can accommodate no more outsiders, but they must swell their war-useful labor forces, and this can only be accomplished by drawing on local sources."

According to latest reports, there are 55 areas of acute labor shortage and 111 areas of insufficient labor supply or in which a labor shortage may be expected within six months. These two groups include more than 20 of the nation's largest cities, and the combined areas had a peacetime population of about 48,800,000, now swollen to approximately 52 millions.

Reports are current the commission plans additional measures to attain full use of available manpower. Measures taken to date have proved insufficient. It is said civic leaders will be asked to assume responsibility for utmost utilization of manpower in their respective communities.

Strike at Republic Steel Cuts Ingot Production

Loss in production of 2300 tons of ingots and 500 tons of pig iron daily is being caused by a strike at the blooming mill of the Republic Steel Corp., Youngstown, O. More than 500 men are idle as result of a protest of workers in the blooming mill against burning scrap. The skelp mill and bessemer also have been forced to shut down.

Gary Openhearth Premium Pay Decision Ends Dispute

Decision ending dispute between Carnegie-Illinois Steel Corp. and local 104, USA-CIO, involving premium pay based on tonnage in No. 5 open-hearth shop of the Gary steelworks, was handed down recently by the arbiter.

GETTING PARTICULAR

Unloading of ore boats at the docks of South Works, Carnegie-Illinois Steel Corp., Chicago, was interrupted for 38 hours recently when 24 unloading machine operators, members of local 65, United Steelworkers of America (CIO), went out on an unauthozed strike.

Although the men filed no formal grievance through their union, they ceased work because they no longer wished to perform the dock maintenance tasks customarily done by them between the arrival of ore boats.

The dispute, going back to last December, involved a series of unauthorized strikes over tonnage rate of pay.

WLB Ultimatum Given Strikers at Brewster

Ultimatum to return to work "unconditionally at once" was handed to 4000 strikers at the Johnsville, Pa., plant of the Brewster Aeronautical Corp. last week by the War Labor Board. The board threatened to invoke for the first time the drastic new powers recently granted it by President Roosevelt.

These powers include the impounding of checked-off union dues, suspension of all privileges accruing to unions, and cancellation of draft deferments.

NE Specifications Changed; Some Series Withdrawn, Others Added

CONDITIONS surrounding production of alloy steels have made necessary certain changes in the chemical composition of the National Emergency (NE) steels, according to the American Iron and Steel Institute.

The modifications were made by representatives of the Metallurgical and Conservation Branch of the Steel Division of the War Production Board; the Office of the Chief of Ordnance, Technical Division, U. S. Army; and members of the Iron and Steel Division of the Society of Automotive Engineers, the S.A.E. War Engineering Board and the Technical Committee on Alloy Steel of American Iron and Steel Institute.

The changes were made to permit greater flexibility in the use of scrap, particularly in the handling of turnings and borings; to make possible higher recovery of molybdenum from steel scrap; and to remove objections on the part of steel consumers to the use of steels containing higher than normal quantities of silicon.

To accomplish these ends, the NE 9400 series was modified by reducing the silicon content to 0.20/0.35 per cent; increasing the chromium content to 0.30/0.50 per cent; and increasing the nickel content to 0.30/0.60 per cent. Those changes will not materially change the hardenability characteristics of the steels and so should not adversely affect testing programs now in progress.

The following compositions have been withdrawn: NE 8020, NE 8442, and the entire NE 9600 series.

The following compositions have been added: NE 9261, NE 9425 and NE 9545.

The chromium content of NE 9262 was revised to read 0.25/0.40 per cent.

Army's Procedure Intended To Effect Fair, Fast Settlements

Large portion of responsibility falls on manufacturer. He must stop work in own plant; halt subcontracts; prepare inventory report, statement of costs and proposal for settlement; act as custodian for government property

WAR Department has made great progress in setting up machinery for the rapid and fair settlement of contracts terminated or cut back.

On Sept. 1 there will be very few unsettled contracts that were terminated or cut back prior to March 1 of this year. This is regarded as a major accomplishment since settlement of large numbers of terminated contracts is an art that has to be learned in time of war; there are no peacetime helps because contract termination procedure goes squarely counter to the common law under which either of two contractors may sue the other for recovery of damages.

Utterly lacking in romance or glamor, the task of settling terminated or cut back contracts is a difficult one. The chief difficulties are: 1—It takes time to get claims from the contractors, particularly in cases of partial cancellations; 2—There often are difficulties in disposing of work in process, and thus establishing sound costs; 3—The program can be carried out only as rapidly as Army procurement officers and contractors develop skill in termination procedure.

Contracts can be terminated by "formula" or by "negotiation." Termination by negotiation can be on an overall cost basis or on an inventory basis. The formula basis provides that finished products be paid for at the original contract price; on unfinished work the contractor is entitled to his cost plus a reasonable rate of profit.

Obstacles Prevent Prompt Settlement

As stated above, one of the chief obstacles that prevent prompt settlement in many cases is the difficulty in establishing costs. X Company, for example, had a partial cancellation early in April and will not get its claim in until some time in November. This company manufactures a very complicated and difficult item on which no other manufacturer has had any experience to use as a yardstick. This item has been cut in half and the costs will have to be determined on the basis of experience.

Many of the terminated and cutback contracts run into millions of dollars. One large company alone has had some 250 contract terminations. Many of them, however, involve much smaller figures. One termination, for example, involved a contract that came to $57 and some change. The contractor did not have enough cotter pins and the product was shipped without the cotter pins and the settlement came to 33 cents.

Allow For Valid Costs

Many contractors have been worried about whether all costs they have incurred will be allowed as valid by the Army procurement agencies. This subject has come up in numerous conferences and meetings held by manufacturers. The answer is that all costs are allowed. This point was made clear in a letter of instructions addressed by Under Secretary of War Robert P. Patterson on June 30 to the commanding generals of the Army Air Forces and the Army Service Forces. This letter ordered the procurement officers to see to it that all materials and parts and machinery set free because of contract terminations should be moved promptly to places where it could be used for the war effort.

"Frequently this material must be sold at a substantial amount below its cost," said Under-Secretary Patterson. "In many instances work in process must and should be sold as scrap for scrap prices. It is inevitable that losses will take place. Rarely will delay in disposing of such property help the war effort or result in any substantial savings to the government. Under present circumstances no material should be hoarded merely in the vague hope that at some future date the property may have a future use or a greater value.

"You will order your contracting officers to pursue a vigorous policy of disposing of such property, promptly and intelligently. They will be supported in the exercise of their honest judgment in carrying out these instructions. The same policy must be applied to obsolete or unneeded machinery and equipment. Where it has no suitable use in production it should be disposed of promptly so that the scarce and critical materials out of which it is made can be used in the manufacture of new and vitally needed instruments of production."

In view of this strong statement it would seem contractors have no grounds for worry about their materials and parts inventories when contracts are cancelled or cut back. Their only problem is to establish a sound claim in answer to the Army's question: "How much money do we owe you?"

One of the good results coming out of the Army's present experience in making settlements for cancelled and cut back contracts is that it rapidly is setting up the procedure for making prompt settlements on a vast scale after the end of the war. An effective approach for speedy action after the war is Procurement Regulation No. 15 issued under date of Aug. 14. Entitled "Termination of Contracts for the Convenience of the Government," it is a 76-page manual carefully defining policy and procedures to be followed in settling contracts of different types.

A few of the typical subheads that reflect the contents of Procurement Regulation No. 15 are: "Protection of rights of assignee"; "Inventory"; "Basis of pricing inventory;" "Return of property by contractor to his vendors and suppliers"; "Grants of discretionary power to prime contractor"; "Ascertainment of value"; "Channels of disposition"; "Disposition of property by subcontractor"; "Protection of property—mitigation of damages"; "Government-furnished equipment and property"; "Negotiated settlement compared with a formula settlement"; "Post-termination costs"; "Form of certificate to be used by prime contractor when presenting statement"; "Applicability of forms and comments to subcontractors"; "Accounting review of the contractor's and subcontractors' statements"; "Expediting partial payments"; "Subcontractors' inventories"; "Uncompleted portion of the contract—negotiated settlement".

Settlement Machinery Is Thorough

These are only a few of the many subheads to indicate the thorough-going nature of the machinery that has been set up for making settlements.

"The termination articles presently in use in War Department contracts are designed to permit, on equitable terms, consistently with the protection of the government's interest, and within a wide range of discretion, the partial or total termination by the government, for any reason whatsoever, of the contractor's right to proceed with the performance of such contracts," the manual states in making reference to the cancellation clause that has been contained in every contract placed since November of 1942.

"To carry out this general policy of all termination articles, the following major principles must be applied:

"(1) **Cessation of work and saving of expense:** All work related to the con-

tract, whether performed by the prime contractor or by a subcontractor or supplier is to be stopped promptly, except where the contracting officer has determined that in the interest of the government, some work in process should be completed. This is to prevent (a) further running up of expense to the government, and (b) waste of labor and materials (see par. 15-321 *et seq.*).

"(2) **Disposition of property:** So far as permitted by the terminated contract, property acquired for the performance of the contract is to be disposed of with reasonable dispatch, as advantageously as is reasonably possible and in a manner which makes such property available for other productive use at the earliest possible moment (see par. 15-350). Property not disposed of is to be transferred to the government.

"(3) **Payments to contractor:** The contractor is to receive fair and reasonable compensation for the work performed and for the supplies and articles furnished under the terminated contracts, consistently with the provisions of the applicable contract article relating to termination.

"(4) **Promptness of payment:** Amounts owing to contractors, by reason of termination are to be paid promptly and without administrative delay.

"(5) **Accounting investigation:** Intelligent reviews are to be made of the requests of contractors for payments in connection with terminations to verify their accuracy and propriety (see paragraph 15-420 *et seq.*). To avoid delays and because of shortages of accounting personnel, detailed auditing will be reduced to a minimum consistent with the protection of the government's interests.

"(6) **Partial payments:** Full use must be made of the provisions of termination articles relating to partial payments, so that all amounts, which are clearly due to prime contractors and, through them, to their subcontractors and suppliers, will be paid at the earliest possible moment (see paragraph 15-500 *et seq.*).

"(7) **Liquidation of advance payments and guaranteed loans:** Advance payments and guaranteed loans (which are existing or potential charges against the funds allocated to terminated or curtailed contracts) will be liquidated in an orderly manner; affording, so far as reasonably possible, protection to the contractor's financial structure so that the contractor and financing institutions co-operating in the financing of War Department procurement will be protected to the extent compatible with the government's interest and that a multiplicity of calls by financing institutions upon the War Department to take up guarantees of loans will be avoided (see par. 15-506.1).

"(8) **Settlements with subcontractors:** Prime contractors must be pressed to effect prompt, fair and reasonable settlements of their outstanding commitments to subcontractors and suppliers and pass on to them a reasonable share of partial payments on account of terminations (see pars. 15-325, 15-500 *et seq.*, 15-654).

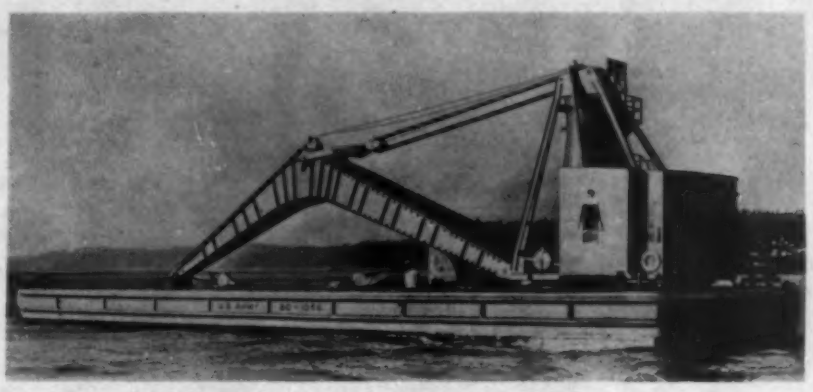
"(9) **Partial terminations:** Where contractors are directed to reduce production by partial terminations, equitable adjustments of costs will be made consistently with the applicable contract articles or with an appropriate and equitable supplemental agreement (see P.R. 306.3 and following paragraphs) in the event that the change causes an increase in the contractor's costs."

When a contractor receives a termination notice (by wire from the contracting officer), he is required to take the following steps:

1. Give directions to stop work in his own plant.
2. Halt at once all subcontracts and purchase orders.
3. Make up a complete list of subcontracts and purchase orders.
4. Set up a schedule for supplying the contracting officer with an inventory report, statement of costs and a proposal for settlement.
5. Lay out schedules for the supplying of similar data by his subcontractors.

The contractor is required to take these steps as rapidly as possible. The War Department has indicated that no compensation will be allowed for work done after a reasonable period has elapsed.

However, special circumstances may make desirable continuance of the work or some phase of it. In some cases, the Army may permit some further processing to obtain a usable end product or component rather than halt work abruptly and scrap semiprocessed materials. The company should call to the attention of the contracting officer any such special circumstances.



ARMY CRANE BARGE: Designed to unload war materials from cargo ships at places where docking facilities are not available, this barge carries a 30-ton crane powered by a 100-horsepower diesel engine. It was built by Pointer-Willamette Co., Edmunds, Wash. NEA photo

Contractor Becomes Property Custodian

The contractor whose contract is cancelled automatically becomes custodian of the property owned by the government and must exercise reasonable care to protect it from damage or loss.

When a reduction in the number of workers is necessitated by the cutting back or cancelling of contracts, joint action is required by the contracting officer and the contractor. The Army officer will notify the regional office of the War Manpower Commission of the anticipated decrease in workers, and the management is asked to give appropriate notice to employes and their union representatives. Management also is asked to inform subcontractors and suppliers of the cutback or termination and to co-operate with the WMC in determining the workers to be released and in placing them elsewhere.

Settling with subcontractors and suppliers is a direct obligation of the prime contractor. These have no direct rights against the government, according to the standard termination clause, and it is up to the prime contractor to see that the companies below him halt production, arrange for the disposal of property and to advise them of the basis on which they may obtain partial payments, help them file inventories, statements of costs and proposals for settlement.

WINDOWS of WASHINGTON

Westwall Cracker

ORDNANCE Department reports it now has artillery and ammunition capable of cracking the highly publicized German Westwall. A section of Westwall was constructed at the Aberdeen Proving Ground; it was a good-sized blockhouse of high-grade concrete with steel reinforcing that duplicated the German design. Dirt heaps in depth, also used in the real Nazi Westwall, were piled up. Gun embrasures were added for realism. When the guns finished the Westwall sample was a shambles. The concrete was pulverized in places. The steel rods were twisted like spaghetti. The shells used, say the Ordnance Department, are high-explosive projectiles of "the same type which bore through thick, case-hardened slabs of battleship armor, then explode inside."

Steel Employment

Now in process of completion is a discussion on iron and steel in the postwar era written by Mrs. Joan S. Crane, Postwar Planning Division, Bureau of Labor Statistics, Labor Department. This treatise analyzes price and employment policy of the steel industry in the six and a half months immediately following the armistice that terminated the first World War. During that period employment in the iron and steel industry fell off sharply. Based on recent field interviews, Mrs. Crane's conclusion is every effort will be made after the end of this war to keep employment in iron and steel plants at the highest possible level.

Subsistence Farming

Short stories which appeared in some newspapers recently on the proposal of Senator John H. Bankhead (D. Ala.) that the government encourage returning soldiers and sailors to acquire small farms failed to reveal the vast industrial implications of this latest farm bloc idea. The basic belief behind the proposal is that to have a sound economy in the postwar era farming again will have to be a "way of life" for an increasing number of people. "Subsistence farming", it is contended, will prove helpful in minimizing the effects of future dislocations and periods of industrial depressions.

Working out of the scheme would result in a boom in manufacture in rural areas of quick-freeze slaughtering and cold storage locker plants. Such a boom already is seen assured in view of the experience in many middle western locations. Many requests now are before the War Production Board for approval of projects in the East, the South and other sections. Some observers predict if subsistence farming is carried to a successful conclusion manufacture of quick-freeze and cold-storage locker facilities will loom as a major industry, rivaling the automotive industry in importance.

Helpful Suggestions

"Guide to Assistance in Placing Orders for Controlled Materials" has been issued by the Education and Inquiry Branch, Controlled Materials Plan Division, War Production Board. This guide is for use by persons entitled to place controlled materials orders but who cannot find a producer or a supplier to accept the orders. The following five suggestions are made: Check "recovery" branches material lists; try as many producers and suppliers as practical; advise your prime contractor, claimant agency or industry division; check with local WPB office; and contact WPB Controlled Material divisions.

BLASTING!

Our big accumulation of aerial bombs is being expended at an enormous rate. During the Tunisian campaign, according to Major General Levin H. Campbell Jr., chief, Army Ordnance, 16,236,390 pounds of high explosive, incendiary, demolition and fragmentation bombs were dropped on the enemy in 386 air attacks.

This record since has been surpassed in the New Georgia, Kiska and Sicilian campaigns but the figures have not yet come off the adding machines . . . The Ordnance Department is supplying 300-odd types of ammunition to the armies in the field; the Army Air Forces take about 240 different types of ammunition.

Using Alloy Turnings

Alloy steel manufacturers are using more alloy steel turnings in their melts than under instruction by the War Production Board. The order calls upon them to use turnings to the extent of 8 per cent of the heat—that is, 80 tons of turnings to produce 1000 tons of ingot. Actually they are charging 11 per cent alloy turnings on the average and some companies are doing better. One of the smaller interests is charging up to 22 per cent turnings.

May Have Something

Army Ordnance Department is investigating the possibilities of utlizing current scrap from war materiel production for further manufacture instead of as melting stock. For example, a Wooster, O., manufacturer of landing mats for the Army Air Forces stamps 4-inch disks out of 10-gage sheets. In the belief these disks can be used for other purposes, a Cleveland interest has been purchasing them at a special scrap price. Recently it was believed the disks could be cold formed into windshields for armor piercing projectiles but further investigation revealed that would result in unbalanced shells. The Cleveland Ordnance District office now actively is exploring possibilities for utilization of these disks. Similarly, use of other scrap is to be investigated.

Airlines Win Point

Airline operators think they have won their struggle to get the Army to turn some two-engine cargo ships over to them for use on regular domestic routes. They expect to receive shortly a small number of these ships, perhaps 25. Headed by Capt. Eddie Rickenbacker, a committee from this industry has assembled evidence that more of these ships are needed for purposes of war production, to transport key military and civilian personnel, and also to carry an increasing amount of freight needed to keep war production lines going.

Radical Shift

There has been a radical shift recently in the controversy between Congress and the administration as to the size of the additional tax burden to be saddled on corporations and individuals. This develops through revelation the President appointed Fred M. Vinson as Director of Economic Stabilization because of his ability as a tax expert. Until May of 1938, Vinson was chairman of the tax subcommittee of the House Ways and Means Committee. Lately he has been conferring with the Treasury Department tax experts and is formulating a program to raise the additional 12-billion dollars which the administration has accepted. Whereas, a good many congressmen are determined no more than an additional five to six billions of tax burden be levied, they are going to find themselves under heavy pressure when Mr. Vinson swings into action. Additional taxation is demanded by the administration to halt the inflationary movement and to pay a greater percentage of the war's cost with current earnings.

READY-MADE DESIGN FOR TAILOR-MADE REQUIREMENTS

Many machining operations which apparently require special equipment can often be done on standard machines with a minimum of tailoring. Machines of this type offer three big advantages:

1. New design "bugs" have already been eliminated.
2. May be changed back to standard arrangement for general purpose work when original requirement no longer exists; or used as is.
3. Lower first cost.

The illustrations at the bottom show how a precision grinding job was handled with this thought in mind by CINCINNATI Engineers. The part, an aircraft cylinder barrel, requires accurately ground surfaces on the diameter and adjacent face of the flange. To do these operations in the most rapid and accurate manner, both are finished in one setting of the work. This requires the grinding wheel head unit to be set at a 30° angle, so that the wheel would make a line contact with the flange (same as the diameter) and thereby produce the best possible finish. The headstock and footstock were interchanged for the purpose of directing the thrust of the cut against the headstock unit. In addition, the machine is equipped with a standard automatic infeed attachment giving the operator a chance to complete his non-productive chores during the grinding cycle. This set-up assures exceptionally close accuracy and rapid production.

Our engineers will be glad to tell you how the CINCINNATI 10" Plain Hydraulic Grinder can be applied to your center-type work. Meanwhile, a quick appraisal of these machines may be obtained by looking at our insert in Sweets Catalog File. If you would like to have complete data, write to us for specification catalog No. G-490-1.

CINCINNATI

● Two close-up views of a CINCINNATI 10" Plain Hydraulic Grinder tailored to suit the job... wheel-head set at a 30° angle; headstock and footstock interchanged; automatic infeed attachment.

CENTERTYPE GRINDING MACHINES . . . CENTERLESS GRINDING MACHINES . . . CENTERLESS LAPPING MACHINES

Adequate Reserves Possible Under Tax Laws, Says Navy Price Chief

Postwar credit reserve to be considered when Congress reconvenes in September. . . Business leaders fear heavy levies will impede ability to convert to peacetime activity and absorb fair share of workers returning from battlefields

MANAGEMENT should be able to accumulate adequate postwar contingency reserves under existing tax laws, in the opinion of K. R. Rocky, chairman, Navy Price Adjustment Board.

In a supplementary statement filed with the House Naval Affairs Investigating Committee, Mr. Rocky opposed amending the renegotiation statute to require allowances to postwar reserves, but took no position on the question of general legislation granting tax concessions to companies setting aside funds for use after the war.

The question of postwar credit reserves is expected to be one of the principal issues before Congress when it reconvenes next month. House Ways and Means Committee will undertake the study of renegotiation beginning Sept. 9.

Business executives hold the view that the present tax system, by impeding accumulation of reserves from earnings, threatens the ability of many corporations to survive postwar readjustments. Upon the capacity of manufacturers to exist through this period of reconversion to civilian goods production depends their ability to provide their share of employment during the changeover period.

It is feared that numerous small businesses may fail and many larger concerns will find it difficult to hold their labor organizations together during the critical period following cessation of hostilities, if private business is not allowed to build up adequate reserves for postwar contingencies.

While most industrial companies recorded moderate improvement in earnings during the first half this year, projection of these earnings for the full year is subject to a number of qualifications. Operating costs are still advancing and agitation for higher wage rates is gaining momentum, while price ceilings remain fixed. The effect of contract renegotiation needs to be considered, and many companies are now experiencing contract cancellations or requests for slowdown of deliveries.

First half net earnings of 340 industrial companies aggregated $617 millions, or 14 per cent above the combined earnings of the same companies during the comparable 1942 period, an earnings survey made by the National City Bank of New York shows. However, first half combined net profit for this group was 22 per cent below that reported in same months of 1941.

The increase in earnings of the group over a year ago accompanied a continued growth in volume of business by many companies, and a recovery by others whose volume was curtailed during the changeover to war work a year ago.

For the 104 companies reporting sales figures, a gain of 38 per cent was recorded over the first half of 1942. Sales increased considerably more than did net income after taxes, indicating lower margins of average net earnings per dollar of sales. Profit margins were narrowed despite the lowering of costs through improved efficiency and greater mass production of war goods.

Tax details given by 201 manufacturing companies show that net earnings before taxes increased 12 per cent in the first half, while reserves for federal income and excess profits taxes rose 11 per cent over the like period a year ago.

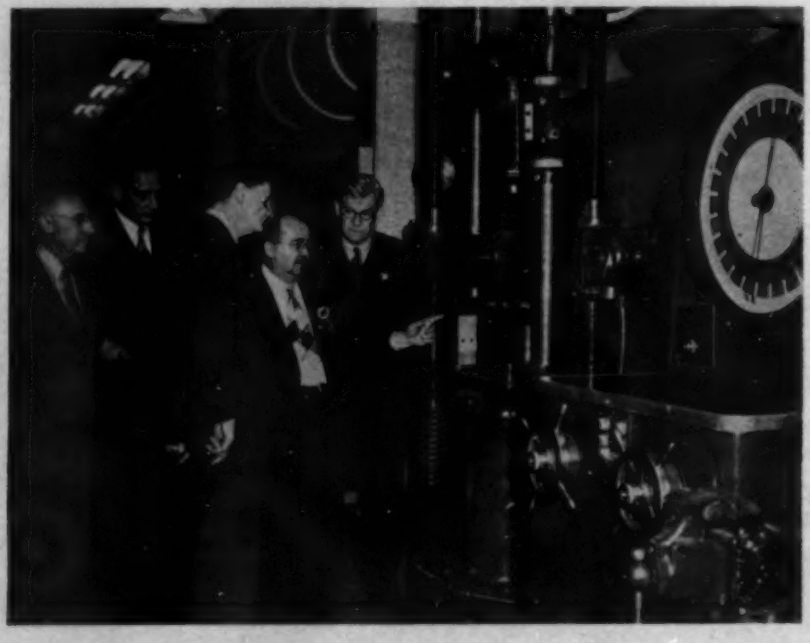
The United States Department of Commerce states industrial companies working on war contracts currently are putting aside nearly 70 per cent of their gross profits for tax payments, compared with 20 per cent in 1939. Nevertheless, the Commerce Department points out that net income of these corporations after taxes in the June quarter this year was 20 per cent above the initial three months of 1942. For non-war industries profits after taxes have declined 10 per cent since the third quarter of 1941, although sales have increased one third.

A breakdown of first half earnings by industries in the iron, steel and metalworking classifications, as compiled by the National City Bank of New York, is presented below.

No.	Industrial Group	First Half Net Income (Millions) 1942	1943	Per Cent Change
27	Iron, steel	$98.3	$87.5	—11.0
12	Elec. Equip.	34.4	41.3	+19.9
24	Machinery	15.4	18.2	+18.2
22	Autos & Equip.	61.9	84.9	+37.2
19	Rail Equip.	10.6	13.1	+24.5
40	Metal Products†	30.9	31.3	+ 1.4

†Other.

Despite the increases during the first



TESTS CAST IRON: Sir Godfrey Haggard, center, consul general of Great Britain watches as Dr. W. L. Merrill, General Electric laboratory engineer, second from right, explains how a cast iron bar is tested under pressure of 60,000 pounds. Others in photo are: Christian Dantsizen, left, in charge of chemical developments at GE; C. G. Ramsey, second from left, Schenectady representative, Associated Electrical Industries of London; and W. V. B. Van Dyck, right, assistant to the president of I.G.E.

half reported by a majority of leading industrial, railroad and utility companies in their sales, operating revenues, and also net incomes, there has been little change in the level of dividend payments. According to a Department of Commerce compilation, the total of dividend disbursements in the first half was one per cent below 1942, but 24 per cent below the like 1941 period.

Announcement that nearly $4 billion had been cut out of war profits to the close of July by contract renegotiation brings up one of the major problems currently facing business executives.

Separation pay under union contracts is one example of what faces industry. A recent estimate of the Bureau of Labor Statistics is that a minimum of six million persons will be displaced during the period of industry reconversion to civilian goods output. Obviously, a substantial percentage of these will be entitled to from one to several weeks pay upon discharge and the aggregate amount involved is likely to be very large.

As a means of reinvigorating and expanding private industrial enterprise, Representative Dewey (Rep. Ill.) recommends tax law revisions to encourage the nation's return to a system of "risk capital." Mr. Dewey also favors loans by banks to local industries as an effective method of aiding the conversion of business to normal activities. He advocated that such loans be guaranteed by the government.

Domestic Ferrous Scrap Consumption Up in 1942

Domestic consumption of ferrous scrap in the United States during 1942 totaled 60,265,151 net tons, compared with 59,216,256 tons in 1941, the previous record year, the Bureau of the Census reports. The greater part of this increase in figures was caused by expansion of the 1942 canvass to include concerns that used scrap in production of ferroalloys and for miscellaneous purposes.

Although total scrap used apparently increased there was a slight decrease, less than 1 per cent, in the tonnage charged to iron and steelmaking furnaces. Total consumption of pig iron was 59,042,883 tons, 5 per cent above the prior year. Use of scrap in manufacture of steel increased 3 per cent while pig iron charged directly to steelmaking furnaces increased 7 per cent. Proportion of pig iron used advanced from 52.2 per cent in 1941 to 53 per cent in 1942. Proportion of purchased scrap used increased from 19.4 per cent in 1941 to 19.6 in 1942. Production of steel for ingots and castings increased 4 per cent.

Peace Design Far Ahead of 1918

World War 1 armistice caught country without reconversion program, contrasting sharply with intensive thinking being done on problem today

WASHINGTON

WHILE a great deal remains to be done to formulate and enact legislation needed to guide the postwar reconversion program, there is every reason to feel encouraged when comparison is made between the intense postwar thinking at the present time with the absolute failure to formulate any postwar program during World War I.

In making this comparison STEEL is indebted to Miss Stella Stewart, chief, Division of Historical Studies of Wartime Problems, Bureau of Labor Statistics, Department of Labor. Miss Stewart has gone back over the record for the year 1918.

Many men in responsible places in World War I were deeply concerned lest the problems of winning the war should divert attention from the crisis that would confront the country when the fighting stopped and when, with no practical government supported program for industrial readjustment, labor would be set adrift in an economy which was not in the least prepared for redirecting its activities.

Nothing was done in an organized way about this problem for a number of reasons. The principal one was that all concerned thought that time was on their side, with the result that the armistice caught the country flat-footed. Another was that President Woodrow Wilson, when not engaged in directing the war effort, was immersed in his plans for world peace.

Many members of Congress realized legislation was needed to insure an orderly transition from wartime to peacetime activities. A series of bills and resolutions aimed at this objective was introduced but no serious debate was accorded them. No hearings whatever were held on the subject of postwar planning. These bills and resolutions were referred to various committees and nothing further was heard of them.

The minute the war stopped, Congress embarked on a campaign to curtail expenditures. Throughout the remainder of 1918 "retrenchment" and "economy" were Congressional watchwords. During that same period the country was dazzled by the participation of President Wilson in the peace conference. Upon his return Congress was engrossed in its historical debate as to whether we would or would not join the League of Nations. In the meantime business was allowed to shift for itself as best it might.

This is a brief digest of an exceedingly interesting analysis. Anyone interested in reading it in detail can obtain a copy of Miss Stewart's report by writing to the Director of Information, Department of Labor, 14th and Constitution avenue, N. W., Washington.

During the first World War it was considered unpatriotic, pro-German, to talk about postwar planning or about anything else other than subjects connected with winning the war. Postwar planning in this war is completely out in the open. The lessons of 1918 have borne fruit and postwar planning now is considered generally as a patriotic, essential chore.

Another big difference is in the administration attitude on the subject of postwar planning. On numerous occasions President Roosevelt and other administrative assistants have pointed out the need for postwar planning. This is in marked contrast with the *laissez faire* attitude of President Wilson.

Fear Character of Administration Plans

The trouble at this time is not due to any oversight on the part of the administration as to the importance of postwar planning but rather to fears in many quarters as to the character of administration plans.

Unlike the Congress of 1918, the present Congress is steamed up over the task of providing laws to make for an orderly control of the postwar changeover pattern. It is true Congress made a rather slow, fumbling start on its postwar planning. However, material progress was made in the last few weeks before the summer recess. Now, with the war on all fronts swinging in our favor, the belief that there is plenty of time to think about postwar planning has been dissipated. In fact, there is a jittery feeling among some of the leading members of both houses over fears that needed legislative action may not be enacted soon enough.

As a result of this realization, various committees of both houses are preparing to hold early hearings on bills aimed at controlling the economy after the war is over. It is principally because of this recognition that a number of Senate and House leaders have been spending a

(*Please turn to Page* 123)

PRIORITIES–ALLOCATIONS–PRICES

Weekly summaries of orders and regulations, together with official interpretations and directives, issued by War Production Board and Office of Price Administration

INSTRUCTIONS

IDENTIFICATION SYMBOLS: Quarterly identification symbols (3Q43, 4Q43, etc.) need not be shown in placing orders for class B product components or other production materials, except controlled materials. For example, the identification "preference rating AA-1, allotment number W-1" is sufficient for the placement of an order for a class B product.

The allotment number must be shown, however, on all orders placed with preference ratings under CMP, even though the quarterly identification is not required. Applications for controlled materials must include a claimant agency pattern and manufacturers will be unable to indicate it unless allotment numbers are placed on orders.

For example, a class B product producer would be required to indicate that he was producing 50% of his products for the Army, 25% for the Navy, 20% for Lend-Lease, and 5% for civilian supply, if such were the case.

The quarterly identification indicates the quarter for which an allotment is valid and must be indicated (1) on all authorized controlled material orders, except those being purchased under a blanket symbol, such as MRO and SO; and (2) on all allotments. The identification, when it is required, must immediately follow the abbreviated allotment number; for example, W-1-3Q43.

CMP REGULATIONS

LEASED EQUIPMENT: A person leasing equipment to others, which he agrees to maintain in good order, may use either his own or his customer's preference ratings and symbols to obtain repair and maintenance equipment. Preference ratings assigned by CMP regulation No. 5 may not be used to obtain items appearing in list A or B of priorities regulation No. 3 and, therefore, list A of CMP regulation No. 5 has been eliminated. (CMP No. 5)

L ORDERS

FIRE PROTECTIVE EQUIPMENT: Installation of electrically or pneumatically controlled fire sprinkler equipment rated AA-5 or higher is now permitted without specific authorization by WPB when it is to be used for following purposes: (1) Protection of transformers, other oil-filled equipment or dip tanks if the equipment installed uses spray heads; (2) protection of powder rolls in plants manufacturing explosives; (3) protection of modification hangar rooms and hangar rooms of aircraft assembly plants where the highest sprinkler head is 35 feet or more above the floor. Application for specific authorization of purchase orders for signal and alarms equipment and air raid warning devices now is made on form WPB-1319. Permitted uses of copper and copper-base alloys are extended and permitted uses of other scarce materials are modified, and restrictions on the use of lead are rescinded by changes in schedule A attached to the order. Required ratings of purchase orders for fire sprinkler systems and fire hose are raised from A-9 to AA-5. (L-39)

OFFICE MACHINERY: Termination date of form PD-688, as revised April 26, used by office machinery manufacturers in applying for authorization to process permitted types of machinery has been extended until Oct. 5. New applications should be made on form WPB-1688 wherever possible. (L-54-c)

FLUORESCENT LIGHTING FIXTURES: Resumption of manufacture of non-industrial fluorescent lighting fixtures after Dec. 1 is authorized by WPB, subject to weight limitations on metal used. Manufacture of these fixtures now is prohibited with demand being met by drawing on inventories which are due to be exhausted by December. Exemption from limits on the amount of metal used is provided for portable industrial type fixtures, hazardous location types, and for use aboard ship. Certain industrial types formerly permitted are now banned with metal weight limits extended to all permitted types other than exempted fixtures. (L-78)

PLUMBING, HEATING EQUIPMENT: Sale or delivery of plumbing and heating equipment is prohibited except on A-10 or higher rating. This covers sales of all except non-metallic equipment from the manufacturing level down to the ultimate consumer. All items of equipment costing less than $5 are exempted from the restrictions. Vitreous china equipment is not restricted but vitreous china equipment with fittings is restricted. (L-79)

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CHROMIUM PLATING: Acid type chromium plating is now permitted on all types of cutlery. Use of chromium plating previously was limited to household table cutlery and hand hair clippers. Chromium plating is helpful in retarding rusting and staining of carbon steel which now is used for cutlery manufacture since stainless steel was prohibited for this purpose. (L-140-a)

BABY CARRIAGES: Production of 349,000 baby carriages and 344,700 strollers, walkers and sulkies for the third quarter of 1943 is authorized by WPB. No additional allotment of materials is necessary to cover the increases of 59,378 carriages and 79,300 strollers over previous quotas as needed materials are available either from prefabricated parts in inventories of manufacturers or from idle and excess stocks. Seven new manufacturers have been assigned quotas. (L-152)

SCALES, BALANCES AND WEIGHTS: Certain types of scales, used primarily by farmers and having a retail list price of $5 or less, may be sold to retailers without a priority rating in amounts of less than $50. Form on which application is made for a preference rating to be used in the purchase of scales now is designated WPB-2581, although copies of the old form PD-857 may still be used. (L-190)

SUN GLASSES: Restrictions on use of metals in sun glasses and sun glass cases apply to parts as well as to complete products. (L-238)

M ORDERS

BERYLLIUM COPPER SCRAP: Segregation of beryllium copper scrap is now required. Order M-160-a provides for the reclamation of beryllium scrap, sets up the mechanism for segregating it and channeling it back to the manufacturer of the beryllium scrap master alloy. WPB also amended order M-9-b, exempting from its provisions control of scrap containing more than 0.10 per cent of beryllium content; and order M-160, withdrawing from the definition of beryllium all beryllium scrap. (M-9-b, 160, 160-a)

TIN AND TERNE PLATE: Hand dusters and sprayers for agricultural uses have been placed in the category of permitted uses for tin and terne plate. (M-21-c)

TUNGSTEN: Conservation order M-29-b, relating to tungsten, has been revoked by WPB. It was explained that tungsten has been under allocation for such a long time that it is believed stocks acquired without allocation are virtually non-existent. Therefore, tungsten now will be controlled by general preference order M-29 exclusively. (M-29-b)

CALCIUM: Allocation order which has controlled distribution of metallic calcium since April 1 has been suspended until further notice by WPB. At the time calcium was placed under allocation it appeared as though a shortage would develop. Supply and demand now are well in balance. (M-303)

P ORDERS

BUILDING OPERATIONS: Preference ratings now are effective for any privately-financed dwelling units authorized by National Housing agency on a CMP construction schedule where application is filed within a limited period of time. The order previously provided that it was effective only for units actually authorized by NHA within the limited period of time. (P-55-b)

PLUMBING, HEATING REPAIRS: Preference rating assigned for repair and replacement of plumbing and heating equipment has been raised to AA-5 from AA-10 by WPB. A certificate of need by the ultimate consumers now is required for purchase of plumbing and heating equipment or parts costing over $5. Any person making sales of items costing less than $5 may use the AA-5 rating to replace his stock. The AA-5 rating may be used by a consumer to purchase parts or equipment (other than stokers) to convert oil-burning or gas-burning equipment to solid fuel-burning equipment. Steel and wrought iron pipe and steel sheets for use in making repairs may be purchased by use of the CMP symbol MRO. The rating authorized by CMP regulation No. 5 (MRO) may be used for plumbing and heating repairs and maintenance only by those industries listed in schedules I and II of that regulation. (P-84)

U ORDERS

UTILITY SERVICES: Utilities now may grant extensions of utility services without filing applications with Washington when the restrictions of a new order, U-1-f, are met. Domestic consumers who seek extension of electric, gas or central heating service must be located in a critical housing area as determined by the National Housing Administration. Water consumers need not be located in one of these areas, as long as other restrictions of the order are met. Industrial and commercial consumers must be engaged in an essential activity as defined in schedules I and II of CMP regulation No. 5. The cost of the extension must not exceed $1500 for underground construction or $500 for other construction. Schedule B of the order sets up complete construction standards for each type of extension, setting forth the specifications of permitted materials. In any case where construction or reno-

vation costs more than $200, permission for construction must be obtained under order L-41 and the utility construction is governed by order U-1-d. U-1-f covers utility extension where construction or renovation cost is under $200, or where none is involved. (U-1-f)

PRICE REGULATIONS

IMPORTS: Ceiling prices of imported manufactured goods may be increased to a limited extent under provisions of a new "Maximum Import Price Regulation," replacing revised supplementary regulation No. 12 to general maximum price regulation. An importer, wholesaler or retailer of imported manufactured goods may calculate his maximum selling price by adding to his total landed costs no more than 75 per cent of his percentage markup or the identical dollars-and-cents markup established by him for a purchaser of the same class of goods during March, 1942. A manufacturer using imported materials may petition OPA for an increase in the price of the article he produces with these materials if he can show that the imported materials have increased so substantially since March, 1942, that he cannot continue to use these materials in the production of that article or to continue to produce the article. Subsequent sellers may increase their maximum prices by adding to their purchase price the same markup allowed importers and other sellers of imported manufactured goods. An importer of manufactured goods may include as a part of his total landed costs items of transportation, insurance, customs duties and other expenses but may not include any increase in the foreign price made by the foreign seller after April 30, 1943. Increases in prices of imported manufactured goods are not allowed for foods, food products, animal and poultry foods, and feeds, or beverages.

Importers of industrial materials may pass on increases in his total, landed costs directly to an industrial user or to an intermediate distributor who sells them to an industrial user. He may not include in his selling prices increases in foreign invoice price made by the foreign seller after Aug. 20. An industrial user may not exceed without permission his March, 1942, maximum selling price for the article he produces with imported industrial materials. (Maximum Import Price Regulation)

Appointments-Resignations

William B. Murphy has been appointed deputy vice chairman for production, WPB. He was previously in charge of the Industrial Facilities committee. He will direct all production activities within the WPB industry divisions and bureaus which report to the office of the operations vice chairman.

—o—

E. F. Tomiska of New York has been appointed director of the Containers Division, WPB. He succeeds Roswell G. Mower of Chicago who resigned. Russell Gowans, former president of the Western Crown Cork & Seal Corp., will succeed Mr. Tomiska as deputy director of the division.

—o—

Harold J. Boeschenstein has been named coordinator of four war production divisions in connection with the production of pulpwood, pulp, paper and paper products. He retains his position as director of the Production Controls Bureau under program vice chairman J. A. Krug.

Simplified System for Granting Individual Pay Raises Established

War Labor Board permits increases without employers obtaining specific permission under certain conditions. . . Average for all employes limited to 5 cents per hour. . . Production costs must not show any appreciable advance

WAR Labor Board last week offered employers a simple system for granting individual pay increases without obtaining the board's permission, provided the raises remain within specified limits and do not force the employer to advance his prices to the public.

Companies with 30 or fewer employes may make merit increases not exceeding 10 cents an hour during any one year for straight-time work, if the total of such increases during the year does not raise the average hourly wages of all employes in the plant more than 5 cents.

However, the employe must not be given a higher rate of pay than the top wage paid by the employer between July 1, 1942, and June 30, 1943, for jobs of similar skill. No pay increases may be granted if they will result in "any appreciable rise in production costs," furnish the basis for a price increase, or violate the terms of a union contract.

Companies employing more than 30 workers were given three ways of allowing raises without board's permission.

Merit increases or automatic length-of-service increases may be granted up to 10 cents an hour for straight-time within any year, or up to two-thirds of the difference between the job's minimum and maximum rates, whichever is greater. Total of such merit increases within any year must not exceed an average of 5 cents per hour for all employes.

Employes promoted to higher ratings may be given increases up to 15 per cent of their salary on their former job, or the minimum rate for the new job, whichever is higher.

WPB Simplifies Rules on Reproduction of Forms

Simplified general rules governing the reproduction of War Production Board forms and orders have been established in priorities regulation No. 5, as amended Aug. 23.

Any person may reproduce any WPB form, order or regulation, but when a form falls into either of the following classes, it must, when reproduced, bear on its face the words "specimen copy" or "information copy" in letters not less than 1 inch high or in 36 point caps:

(1) Forms or orders which are designed to be issued by any government agency and which have not yet been signed by the government agency; for example, form GA-146 which is used by various industry divisions of WPB to authorize purchase or sale of particular goods. The limitation does not apply to forms which are both designed to be filed with the government agency and later to be issued to the applicant by the government agency. For example, the limitation would not apply to such forms as WPB-541 (formerly PD-1A).

(2) Forms bearing a serial number, designed to be filed with a governmental agency and later issued by the agency but which have not yet been signed by the agency. A most common example of this class is form WPB-542.

Forms may be reproduced by any process (photographic, printing, mimeographing, or otherwise) but the following conditions must be observed:

(1) If the forms are reproduced for filing with a government agency, the copy must be exactly like the officially published form as to paper, size, format, and arrangement of paragraphs or tables on each page. The color of the paper must be approximately the same as official copy.

(2) Copies of all orders or forms bearing the signature of any official of the United States government or any other authorized person must include the signature. This signature must be in type or print preceded by "(signed)" unless the entire order certificate is reproduced by photographic process.

Statements contained in orders or forms to the effect that they may not be reproduced may be disregarded if the conditions of this regulation are complied with, unless the order or form states specifically that the regulation does not apply.

Petroleum Supply Field To Get Priority Aid

A Supplies Section, devoted exclusively to problems of petroleum supply distributors, has been established in the Wholesale and Retail Trade Division, War Production Board.

When Installing Bearings

IT PAYS TO BE A "YES-MAN"

These hints will help you get maximum performance from all types and makes of bearings. They are highlights from Hyatt's Bearing Maintenance Handbook, and are published here as a wartime service.

Yes

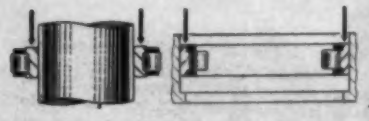
Keep bearings clean...away from dust, dirt and moisture. Leave them in original wrappings until ready for use. (Hyatt Roller Bearings are protected against rust and corrosion by a special lubricant)

No

Do not handle bearings unnecessarily; avoid touching roller operating surfaces, as moisture from the hands may cause rust. Be sure that hands, tools and surroundings are clean at all times.

Yes

When bearings or bearing parts are assembled on a shaft, apply pressure to end of inner ring or race; when in a housing, apply pressure to end of outer race. Lubricate all shaft and housing surfaces which are in contact.



No

Never apply pressure to roller cages, ball retainers, seals or end rings. Don't "cock" the race ...damage to both shaft and bearing will result. Always apply pressure to the race ends straight and square.

Yes

Assemble bearing on shaft and into housing carefully to avoid scoring races and rollers. Lubricate thoroughly and regularly according to manufacturers' specifications, using fresh, clean lubricant.

No

Never, never, NEVER strike any part of any bearing with a hammer. Use an arbor press, hammer-and-drift, or bearing driver instead. A bid using wooden or soft metal mallet, as chips may get into the bearings.

READY SOON: The Hyatt Roller Bearing Maintenance Handbook is now on the press. Would a copy help you? If so, write on company letterhead to Department 204, Hyatt, Harrison, New Jersey. We'll be glad to send you a copy with our compliments.

HYATT ROLLER BEARINGS

HYATT BEARINGS DIVISION · GENERAL MOTORS CORPORATION · HARRISON, N. J.

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Automotive industry registers 80 per cent increase in dollar volume of war production during past 12 months. . . Monthly totals moving higher but indications are output approaches peak, if not at that point already

DETROIT

EIGHTY per cent increase in war production in the past 12 months is the record of the automotive industry, in terms of dollar volume which unfortunately does not tell the whole story because it does not reflect voluntary price reductions, renegotiations, contract cancellations and changes.

Despite all restraining influences, however, monthly totals move steadily higher, preliminary reports for July adding up to $775,000,000 worth of output. This is an increase of over 27 millions from June, and 347 millions from July a year ago. At the present level annual production would be at a rate of around 9 1/3 billion dollars.

This total represents 2½ times the wholesale value of all cars and trucks produced in the industry's best year, but it should be remembered that the war production volume includes not only the principal motor companies, but close to a thousand parts suppliers and outside contractors as well, which are now lumped in with the motor plants to constitute the "automotive industry."

Percentage Increase Leveling Off

It is likely that war production is approaching, if not having already attained, a peak. A few more major plants still are some months away from even a fair production level, but their incidence may be counteracted by a decline in other plants and further price reductions in plants where volume production permits lowering of unit costs. August totals may show another increase over July, perhaps 20 millions or so, but percentage-wise the rate of increase is slowing rapidly.

Some time ago Donald M. Nelson predicted an annual volume at the rate of 12 billions for the industry, or one billion a month. It is extremely doubtful if this figure ever will be reached. A peak level of 900 million a month, or annual rate of 10.8 billions would be an even more remarkable achievement than that already recorded by the industry.

In a radio address a week ago presented by the World Wide Broadcasting Foundation of Boston, Charles F. Kettering, General Motors research chief, added his two-bits' worth to the thinking on how long it will take American industry to reconvert to peacetime production. He said, "It depends on when and how the war is going to close. I think that if it's evident five or six months in advance of the close of the war it's going to close, then you'll have time to readjust, and the military people can advise you when to start reconverting. But if it should stop very suddenly, you won't have that advantage.

"We have two kinds of people who talk about a postwar world. There are those who look into a crystal ball and see a world entirely different from what we now have, and those who look down into the great cold places where worlds go when they are finished. I don't believe either one of them is right. I don't believe we will have a new world, or a much different world, and I don't believe that our present world is going all to pot. The main factor we will all have to deal with after the war is the rate at which human beings can be trained to change.

"Whatever we do we will have to do against great resistance, because people don't like to change their minds. This will come from the people who know so much about the difficulties of doing anything that they are going to be afraid of the new thing because they think it won't work. But when you get down to finding out what you know and what you don't know, there is so much more on the don't-know side that we hesitate to call it to people's attention."

This, if you can leap Boss Ket's grammatical hazards, is pretty sound thinking on the postwar world, not only for automobiles, but for industrial activity in general.

As mentioned in STEEL last week, a new model of the North American P-51 Mustang fighter plane, now in service on the battlefronts for several months, is powered by a Packard-built Rolls-Royce engine equipped with two-speed two-stage supercharger. Despite the fact this information has been widely published in recent weeks, and technical descriptions of the supercharger have appeared in both U.S. and British publications, Packard until last week was permitted to say nothing about the development.

George Christopher, Packard president, reported that the new supercharger, in effect, raises air warfare nearly two miles higher, and steps up engine horsepower to better than 1500. It comprises essentially two separate rotors, the first compressing air in fashion comparable to that of the single-stage supercharger and passing it on to the second rotor where it is compressed further. An aftercooler then relieves some of the intense heat of the compressed air before it is passed on to the engine intake manifold.

Licks Difficult Design Problems

Working in conjunction with Rolls-Royce engineers from England and Army Air Corps engineers, Packard licked a number of difficult problems in design and manufacture. The rotors or impellers, for example, are aluminum forgings shrunk on a splined steel shaft and machined to precision tolerances. The assembly must be balanced to 0.01-ounce-inch, and runout of the blades held to 0.0002-inch. The need for such precise manufacture can be appreciated from the fact the impeller operates at speeds up to 25,000 r.p.m. giving a peripheral speed of 1271 feet per second. The supercharger, it is pointed out, is gear driven and not turbodriven as are some other newer types of engine "boosters." It is normally controlled without any effort on the part of the pilot, although he has the option, when desired, of controlling the device, whether through a variable-speed transmission or gear shifting it is not disclosed.

A British-built supercharger of the same design is used in Lancaster and Wellington bombers, Mosquito all-wood fighter-bombers and Spitfire pursuit ships.

In connection with plant operations, Mr. Christopher pointed out that the Packard employe suggestion system is working out unusually well. In its first year of operation the plan produced 18,330 ideas from employes, 9207 dealing with improvements suggested in shop operations. Of these, a review committee has accepted 2338 and they have now been incorporated into practice. Ideas considered especially meritorius

SHARE-THE-STEEL

Steel consumers were asked recently by John T. Whiting, director, War Production Board's Steel Division, to continue voluntarily the Share-the-Steel drive. This drive increased available third and fourth quarter steel supply this year by more than a million tons through allotment cancellations.

"Continued sharing of steel to help win the war is necessary because requests for steel by the claimant agencies are more than 4,000,000 tons above the available supply," Mr. Whiting said.

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are forwarded to the War Production Board at Washington, and of the 389 ideas submitted by all plants in the country and accepted by WPB as deserving of recognition, 54 came from Packard.

Certain basic details of the power train which drives the M-5 light tank, built by Cadillac here in Detroit and until recently by the Southern California Division of General Motors, have been disclosed by the army. It comprises two Cadillac V-type 8-cylinder 90-degree engines and two Hydra-Matic transmissions operating through a transfer unit into which both side-by-side mounted engines drive. Except for details required to adapt the units to tank design, both engines and transmission are identical with those used in Cadillac passenger cars prior to the suspension of production last year.

Automatic Shift Invaluable

The transmission is a combination of a fluid flywheel and automatic gear shift, and is said to make a tank so equipped extremely flexible and maneuverable, as well as capable of operating at sustained speeds with no slowdown to shift gears. By the same token, it is more easily mastered by new tank crews. Firepower on the M-5 consists of a 37-millimeter cannon and three machine guns.

The local WPB office reports that the share-the-steel campaign among Detroit plants has been productive of 79,751 tons, of which 59,402 tons were carbon steel and 20,349 alloy. The total amount represents tonnages which investigation proved could be canceled or deferred without interference to war production.

Through improvements and redesign of packaging procedure, Studebaker has reduced measurements of unassembled military truck crates by 55 per cent, or from 878 cubic feet to 389 cubic feet. Chief revisions involved detachment of axles from frames, and a twin-unit pack.

Survey of the status of automobile mechanics in 1325 automobile dealer establishments throughout the country, made by the National Automobile Dealers Association, shows employment to have dropped from 9714 to 8797 in the period from Jan. 1 to July 1. As of the latter date, the 1325 dealers surveyed indicated a need for a total of 4437 additional mechanics; also that they had lost 1608 men to war industries, 1024 to the armed forces and 1696 elsewhere. Thus, losses in personnel since Jan. 1 total 4328, despite the fact total employment has dropped only 917. Sharpest losses were encountered in 1942, amounting to about 40 per cent.

While some women have been pressed into service as automobile mechanics, consensus is that they have not proved satisfactory. The above group of dealers reports 483 women employed, and only one-third of the shops reporting rated the women as satisfactory replacements.

Gradual abandonment of Kirksite or soft-metal dies in aircraft plants working closely with the automotive industry has been in process over recent months. Ford's Willow Run bomber plant and the Republic Aviation plant in Evansville, Ind., both closely tied to Detroit tool engineering practice, have turned to hard dies, despite their somewhat higher initial cost. In fact, some Detroit die interests maintain they can produce a hard (cast iron or steel) die at comparable cost with the soft metal, considering the fact the latter occasionally will crack at the very start of a run. Furthermore the hard dies provide increased production and better accuracy in the formed parts.

ARMY TRUCKS: To haul supplies for the United States Army and for other United Nations forces, Army trucks are being turned out in large numbers in this Dodge plant. Automobile and truck output currently averages about 20,000 units weekly. NEA photo

WLB Plans New Section To Settle Auto Disputes

War Labor Board is planning to organize an automotive section which would handle labor disputes of automobile and automobile body companies throughout the nation with jurisdiction over about 1,000,000 workers. With headquarters in Detroit, the section would settle disputes on a national basis.

Under the present system, the national and regional boards handle all automotive cases. David A. Wolff, Detroit attorney and veteran of labor arbitration, is to be chairman of the section.

Nut, Bolt Recommendation Awaits Industry's Approval

Revision of simplified practice recommendation R60-30, relating to the packaging of carriage, machine and lag bolts, has been placed before interested groups for acceptance after receiving the approval of the standing committee in charge of reviewing and revising the recommendation and the standards committee of the American Institute of Bolt, Nut and Rivet Manufacturers.

To Cut Variety of Safety Valves from 3000 to 200

A simplified practice recommendation for iron and steel pop safety valves, identified as R201-43, has been approved for promulgation and is to be effective Sept. 15, division of Simplified Practice, National Bureau of Standards, announced.

Recommendation includes iron body, carbon steel body, alloy steel body, and pop safety valves, intended primarily for land steam service. Variety will be reduced from approximately 3000 to 200 and the simplified list will satisfy 95 per cent of the requirements for these valves, considering models, inlet sizes, outlet sizes, and connections.

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WING TIPS

New type engine mount, developed by Douglas Aircraft Co., reduces costs, simplifies repairs and eliminates necessity for certified welders . . . Inventors at Glenn L. Martin Co. share in income from patents

SAVINGS in cost, simplification of repair in the field and elimination of the requirement for certified welders in manufacturing are three advantages cited for a new type of radial engine mount developed by engineers of Douglas Aircraft Co. Inc., Santa Monica, Calif. Typical installation in a C-47 cargo airplane —military version of the former DC-3 passenger liner—is shown in Fig. 1 with cowling removed to show propeller and engine unit attached to mount which in turn is supported by the nacelle framework.

Engine mounts of this type are common in virtually all large airplanes powered by radial engines, the conventional design being of gas welded chrome-molybdenum steel tubing. Douglas revised the design to embody tubular supporting arms bolted to bracket forgings at the rear for attachment to the nacelle and bolted to a forged steel engine ring at the front. Use of the forged ring at the front instead of the conventional tubing is the unusual innovation.

Half-Section Rings Preferable

A number of rings as received from the forging supplier are shown in Fig. 2. These are half rings, it will be noted, although a number of mounts have been built of quarter-ring sections, prior to the time facilities were established to forge the larger half-ring sections. Half-section rings are preferable since they do not involve all the necessary checking to make sure the four pieces are in perfect parallel, and eliminate the need for flash welding two quarter sections into a half section before machining, together with the required magnaflux inspection of the weld, machining of the weld, etc.

Before arriving at the machine shop the forged half sections are straightened in a press, heat treated, restraightened, sandblasted and magnaflux checked for imperfections.

Upon entering the machine shop the rings are checked on a jig set up for the first milling operation, the operation itself being shown in Fig. 3. The preliminary check is to make certain the rings are perfectly straight or flat, the check being made from the web of the section and not from the bosses.

Bosses on the rear or nacelle side of the ring are held to within 0.005-inch of the parallel line, while the front surfaces, facing the engine, need not be held to such close tolerance. Milled surfaces are checked on a surface plate.

The rings then move to a No. 3 vertical milling machine where the bosses are elongated, after which holes are drilled on the outer edge to accommodate the cowling. Angular bosses then are drilled and spotfaced on a compound angle setup, and the rings continue on to a No. 2 Simplex for milling the ends. A radial drill then puts the holes in each end for assembly and the pieces are back-spotfaced around these holes. In backspotfacing on the angular bosses, succeeding operation, an ingenious magnetic chuck arrangement is used to hold the rings steady. Final step in the machine shop before inspection is burring of rough edges by portable tools.

In the machining operations, it might be pointed out that the setups for drilling and spotfacing the angular bosses at compound angles, and the magnetic chucks just mentioned both grew out of suggestions made by employes in the shop for improving speed and accuracy of the work.

Machined rings are hung in a cadmium electroplating bath. Solution in the bath

Fig. 1—Left, engine mount on C-47 two-motor cargo airplane is a combination of steel tubing and forged steel engine ring, bolted together

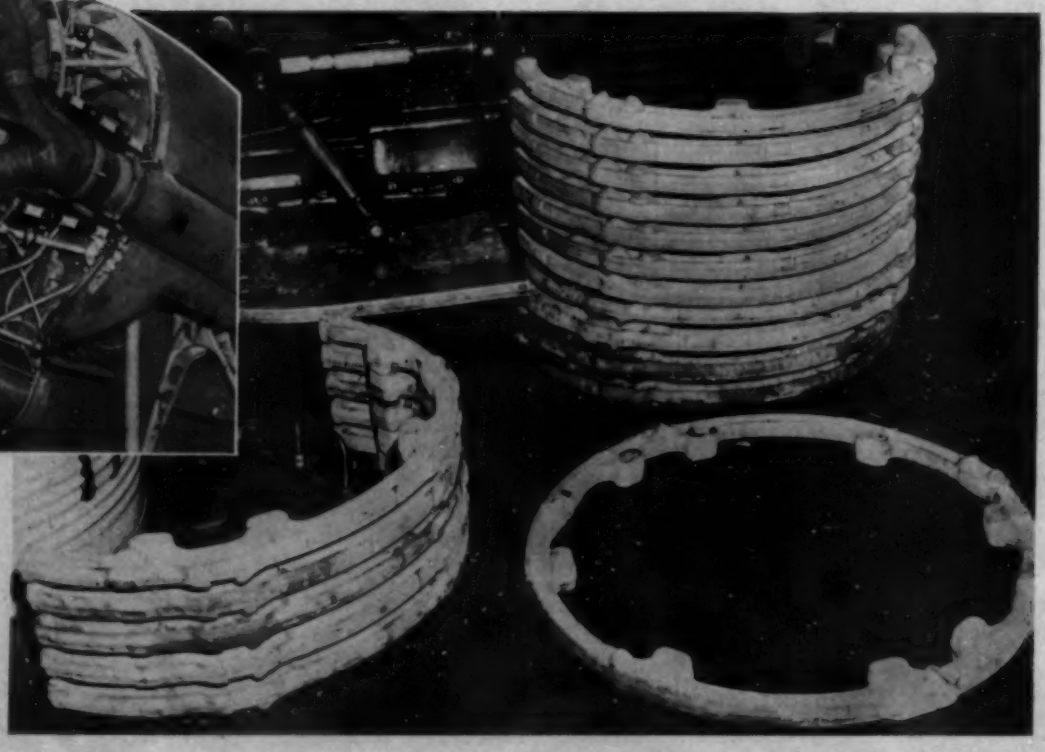
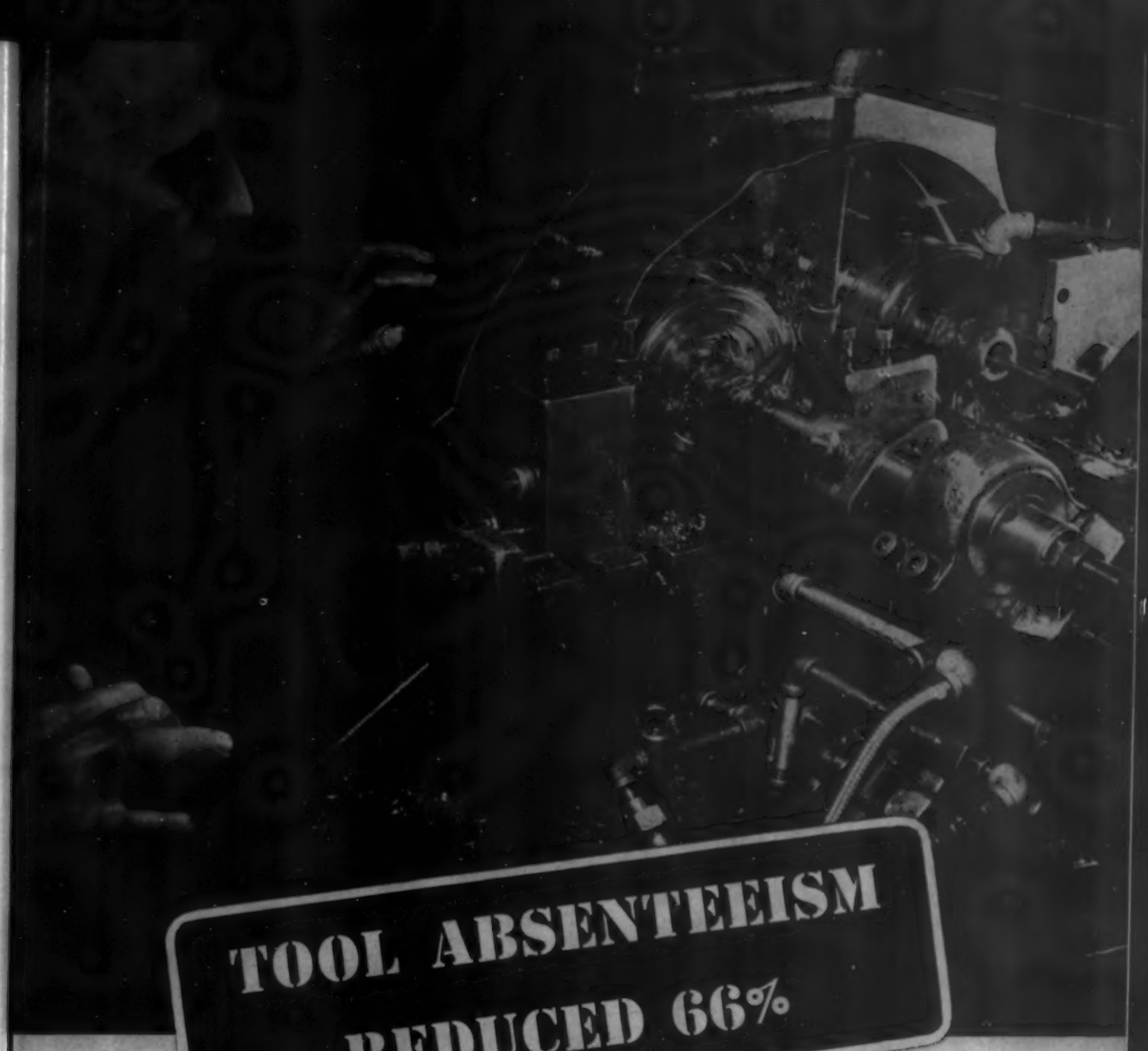


Fig. 2—Right, forged alloy half rings as they are received from the forgings supplier, with an assembly of the two halves at right



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Tool "absentees" can hurt war production just as much as the operator who stays away from his job. One large plant faced with the problem solved it this way.

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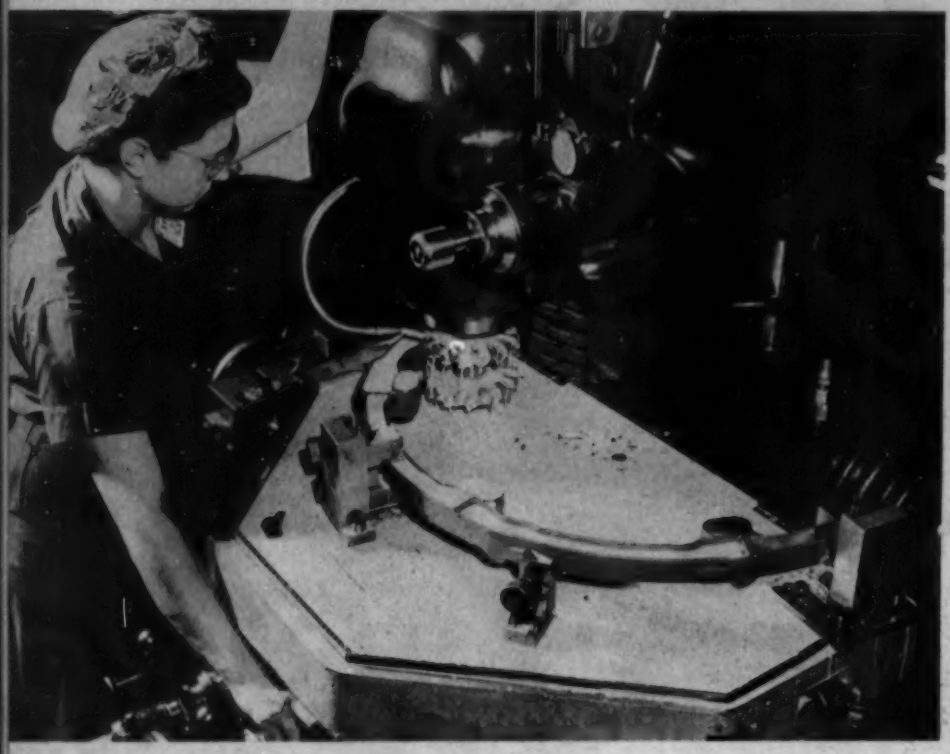

Fig. 3—Above, milling operation on ring bosses of half ring. Early design involved quarter-section rings, flash welded into half ring before machining

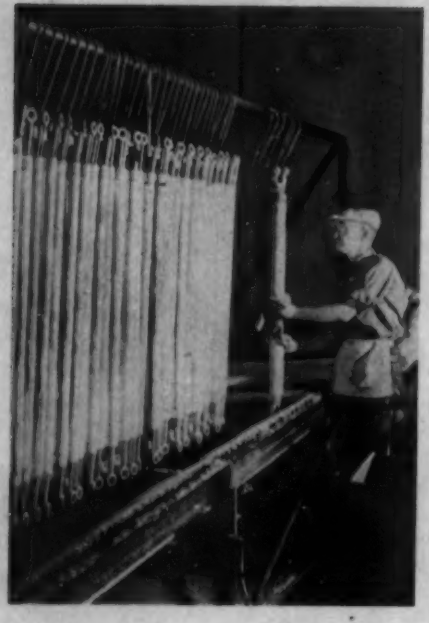

Fig. 4—Left, steel tubes for supporting arms of mount, with end cap and fitting flash welded to body. After plating, the tubes are oiled and sealed with steel plugs

includes cadmium oxide, sodium cyanide, sodium hydroxide and a brightener, operating at room temperature. Voltage is 2½, current density 20 amperes per square foot. Depth of plated material is 0.0005-inch to conform to Army and Navy specifications. Plating operation requires about 15 minutes, after which the parts are rinsed in cold water, then hot water, and dried.

Fig. 4 shows a group of flash welded tubes which comprise the supporting arms of the mount as they are being oiled after cadmium plating. Plating process is similar to that used on the rings, except that after rinsing the tubes are placed in an oven at 250 degrees to dry the interior thoroughly, after which they are immersed in oil heated to 160 degrees, drained and fitted with a steel plug. The inner coating of oil, sealed by the plug, guards against possible chance of corrosion which might lead to corrosion fatigue failure in the tube.

Assembly of ring and tubes into the finished mount is quite simple, women operators being fully capable of handling the job. Machined brackets are set in their proper places in the jig. The tube assemblies are inserted into the brackets and securely bolted. Then, after small rubber insulation assemblies are inserted into the slotted bosses, the half sections of the forged ring are bolted to the supporting tubes and the two halves themselves finally bolted together. All bolts are tightened to 300 pounds pressure, using torsion wrenches to insure uniform pressure on all bolts.

Stainless steel firewalls are important elements of every engine, mount and nacelle assembly. Assembly of the firewall is simple, steel being sheared to general size, blanked out on a press, including the cutouts, edges carefully burred, and finally consolidated into the nacelle assembly. Drilling and riveting on the firewalls is handled in the nacelle jigs.

Inspection of Fig. 1 will show another firewall or ring on the forward face of the engine mount directly behind the exhaust manifold. This is also stainless steel, blanked and formed to shape, radial corrugations giving additional strength. Stainless steel commonly used in firewalls is the 18-8 chrome-nickel type stabilized with columbium. Some pressure is being exerted to conserve stainless steel by compelling a switching to plain carbon steel firewalls on certain types of airplanes.

Martin's Employes Benefit from Patents

Employes' patent remuneration plan, under which an employe is given an equitable share in any income derived from an invention through the licensing of outside manufacturing rights, has been instituted by Glenn L. Martin Co., Baltimore. Although the plan has been in operation only a short time, seven Martin inventors are already somewhat richer.

The patent remuneration plan in no way conflicts with the War Production Drive suggestion box procedure, but is an added source of remuneration.

Once the invention is disclosed to be patentable, the patent department contacts the inventor and assists him in preparing the proper writeups, filling out the correct forms, and gathering together working models and other materials needed in order to apply for a patent. If the inventor's own models and plans are not sufficient, models and plans that will serve the purpose are prepared by the tool design, toolmaking and engineering departments. After the models and other material have been correctly prepared, a patent is applied for in the employe's name and assigned to the company.

California Aircraft Wage Schedule Approved

New wage schedule for employes in California plants of Consolidated Vultee, Douglas, Lockheed-Vega, North American, Northrop and Ryan companies has been approved by the regional WLB and is now in effect retroactive to March 3. Minimum hourly wage rate is set at 75 cents, and 14 "grades" of labor are established with minimum and maximum rates for each. Top grade or No. 1 is $1.40-$1.75, while the lowest or No. 14 is 75-80 cents.

Beyond these limits the schedule permits establishing "A" employes in each of the top six grades who because of exceptional qualifications may receive a premium of from 15 to 20 cents an hour beyond the basic maximum.

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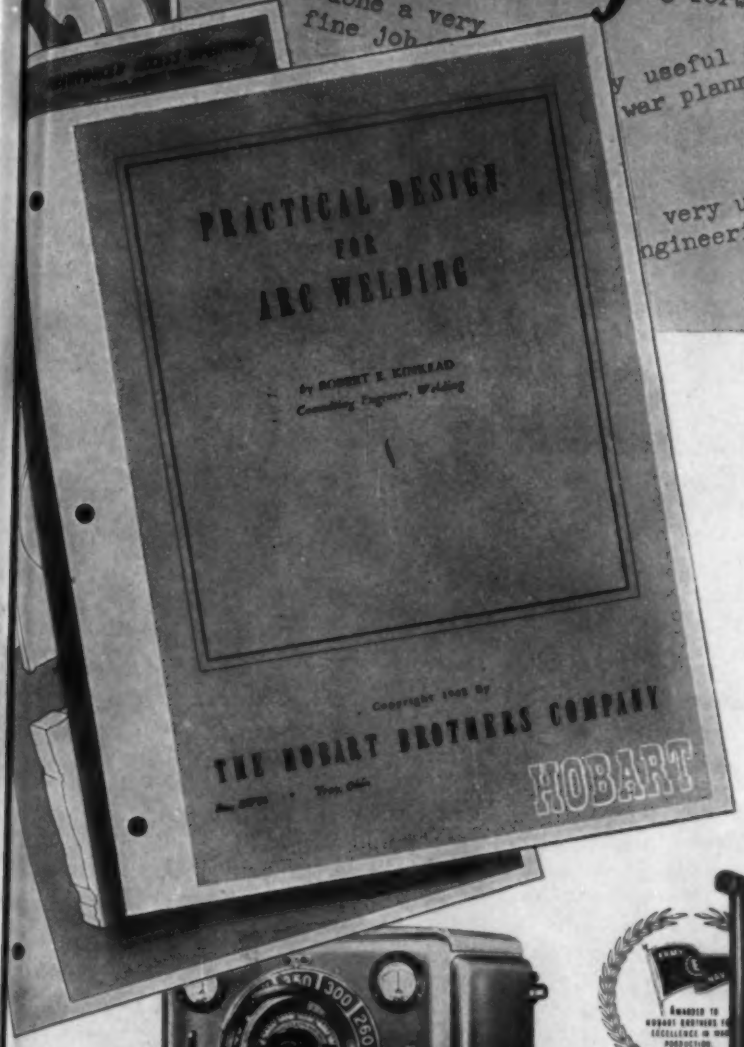

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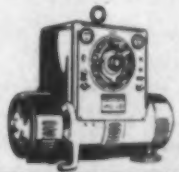

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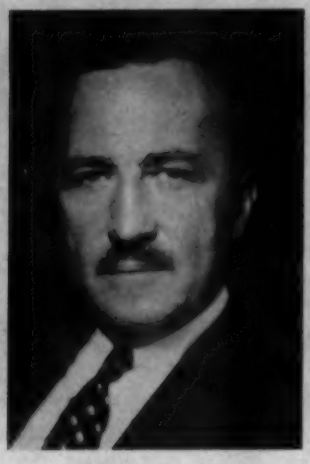


WILLIAM P. WITHEROW

GEORGE D. SHAEFFER

CLIFF DUNHAM

E. Perry Holder, president since 1940 of Vulcan Iron Works, Wilkes-Barre, Pa., has been elected president of Wickwire Spencer Steel Co., New York. Mr. Holder succeeds **E. C. Bowers,** who has been president of Wickwire Spencer Steel Co. for 17 years. Although he is resigning because of illness, Mr. Bowers will continue as a member of the board and the executive committee.

—o—

William P. Witherow, president since 1937, Blaw-Knox Co., Pittsburgh, and director of the company for the past 10 years, has been elected chairman of the board. He will continue to serve as president. Mr. Witherow founded the Witherow Steel Co., which later was acquired by Donner Steel Co. Donner Steel Co. then was absorbed by Republic Steel Corp. and Mr. Witherow was vice president of Republic until his resignation in 1932.

—o—

I. E. Harris, former superintendent, St. Paul works, International Harvester Co., has been appointed superintendent of the Harvester War Depot Inc., newly-organized subsidiary of the Harvester company, formed for the purpose of operating the Rossford Ordnance Depot. **Joseph Russell,** former general foreman of Harvester's McCormick works parts warehouse, Chicago, has been named assistant superintendent of the new organization.

—o—

John M. McKibbin, manager, application data and training department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has received his company's highest honor, the Order of Merit, for distinguished service.

—o—

Alexander Kennedy Jr. has been appointed assistant to the manager in charge of engineering, and **Howard P. Bish** has been named assistant to the manager in charge of administrative affairs, Federal and Marine divisions, General Electric Co., Schenectady, N. Y. Both positions are newly-created.

—o—

George D. Shaeffer has been appointed chief engineer, engineering departments, Gar Wood Industries Inc., Detroit, and **A. C. Evans** succeeds him as chief engineer, Road Machinery division. Other appointments by Gar Wood are: **I. C. Moreau,** chief engineer, Hoist and Body division, and **J. E. Monahan,** manager of all hydraulic engineering.

—o—

A. J. Ebner, Freyn Engineering Co., Chicago, left Aug. 16 to supervise construction of open-hearth furnaces at the new steel plant of the Companhia Siderurgica Nacional, Volta Redondo, Brazil.

—o—

R. Verne Mitchell, chairman of the executive committee of McDonald, Coolidge & Co., Cleveland, and a director of Thompson Products Inc., also of Cleveland, has been elected a director of Copperweld Steel Co., Glassport, Pa.

—o—

Chalmer Lafferty has been named president of Chalmer Machine Products Co., Cleveland, a new company.

—o—

Paul Dietz has been appointed export sales manager, General Machinery division, Allis-Chalmers Mfg. Co., Milwaukee, succeeding the late Harlow Bradley. Associated with the Export division of B. F. Goodrich Co., Akron, O., for the past 15 years, Mr. Dietz has been stationed in Mexico, China and French Indo-China.

—o—

J. Sawyer Wilson, former employment manager, Republic Aviation Corp., Farmingdale, N. Y., has been named training manager. **Howard E. Richards,** who was in charge of industrial relations at Rheem Mfg. Co., Sparrows Point, Md., before joining Republic Aviation Corp. recently, succeeds Mr. Wilson as employment manager, and **Donald W. Patterson,** former personnel service supervisor, has been appointed assistant director, industrial relations, for the night shift.

—o—

Cliff Dunham, former purchasing agent for the Peoria plant, Willamette Hyster Co., Portland, Oreg., has been named Chicago purchasing agent, operating from the company's newly-opened office there.

—o—

William D. Kennedy, vice president, Wright Aeronautical Corp., Paterson, N. J., has become manager of the Lockland plant, Cincinnati, succeeding **W. W. Finlay,** who has been appointed head of the corporation's industrial relations and personnel department.

—o—

M. L. Jarboe, secretary, Diamond Alkali Co., Pittsburgh, has been elected vice president in charge of finance and accounts. Mr. Jarboe will retain his position as secretary.

—o—

Clarence C. Helmle, former head of the inorganic laboratory, General Electric Co., Bridgeport, Conn., has joined the technical staff of Enthone Co., New Haven, Conn., where he will be engaged in plating equipment design, process development and technical service.

—o—

Jack Meyer has been appointed vice president and general superintendent, and **L. T. Anderson** has been named vice president in charge of sales and engineering, National Alloy Steel division, Blaw-Knox Co., Pittsburgh.

—o—

Allen B. Lindsay, president, Lindsay Engineering Co., Cleveland, has been named president and treasurer of Lectro-

etch Co., Cleveland, a new company producing marking devices. **Elmer Schuttenberg** is vice president.

—o—

William M. Stabler has been appointed service manager, American Propeller Corp., Toledo, O., subsidiary of Aviation Corp. Previously, Mr. Stabler had been service manager for Aviation Corp.'s Liquid Cooled Engine division.

—o—

E. E. Duffy, former planning secretary, Wayne County Road Commission, Detroit, has been appointed director of public relations, American Road Builders' Association, Washington.

—o—

L. W. Teegarden has been named assistant general sales manager, RCA-Victor division, Radio Corp. of America, Camden, N. J.

—o—

Herluf Nielsen has been appointed chief metallurgist in charge of the technical department, Kinney Aluminum Co., subsidiary of Kinney Iron Works, both of Los Angeles.

—o—

Robert Onan has been appointed sales representative in the Chicago area for Duraloy Co., Scottdale, Pa. Mr. Onan's office is located in the Wrigley building, Chicago.

—o—

E. A. Stein has joined the engineering department of Maysteel Products Inc., Mayville, Wis.

—o—

George J. Parker has been appointed time standards engineer, Sperry Gyroscope Co., Brooklyn, N. Y., heading a new department to develop time standards in all plants for management control.

—o—

F. B. Schwartz, manager, Minnesota Pneumatic & Electric Tool Co., Minneapolis, Minn., has been named special Northwest representative for the complete line of products of H. K. Porter Co. Inc., Pittsburgh.

C. T. RUHF

Who has been elected president, Mack Trucks Inc., Long Island City, N. Y., as announced in STEEL, Aug. 16, p. 72.

—o—

Frank J. DeRewal, formerly associated with Battelle Memorial Institute, Columbus, O., has been placed in charge of metallurgical research and development for Delloy Metals and Penn Rivet Corp., Philadelphia.

—o—

Frank J. Staral has been named field engineer in the Chicago, Illinois and Iowa area for Alloy Casting Co., Champaign, Ill., and **James H. Ross** has been appointed field metallurgical engineer, Detroit.

—o—

Richard W. Murray has been appointed brush engineering representative, Connecticut and Rhode Island territory, for Osborn Mfg. Co., Cleveland.

—o—

Richard Hammerstein and **T. J. Clark** have been appointed to the engineering staff, Heat Treating division, Park Chemical Co., Detroit.

—o—

H. L. Griffin has been appointed safety engineer, Harbor Land Co., Fairport Harbor, O., subsidiary of Diamond Alkali Co., Pittsburgh.

—o—

John Robert Doig Jr., physicist, has been appointed to the research staff of Battelle Memorial Institute, Columbus, O.

—o—

Dr. Alexei Bach, Russian biochemist, and **Dr. Te-Pang Hou,** Chinese industrial chemist, have been elected to honorary membership in the Society of Chemical Industry, London.

—o—

Colin Westerbeck has been named St. Louis sales manager, Continental Can Co., New York, succeeding **Elliott W. Beckett,** now vice president and general manager, Continental Can Co. of Canada Ltd. **Bertram M. Brock** has been appointed manager of the newly-formed industrial relations department.

—o—

Fred F. Murray, former vice president, Oil Well Supply Co., Dallas, Tex., subsidiary of United States Steel Corp., has been elected president. Mr. Murray, who is president of the Petroleum Equipment Suppliers Association and a director of the American Petroleum Institute, succeeds **Benjamin F. Harris,** resigned.

—o—

D. T. Wellman has been placed in charge of the branch office Terminal Tower building, Cleveland, for Dow Chemical Co., Midland, Mich. **T. H. Caldwell Jr.,** formerly in Dow's Magnesium Production division, has been named to assist Mr. Wellman.

—o—

C. N. Guerasimoff, former assistant chief engineer in charge of the Radial Diesel Engine division, Buda Co., Harvey, Ill., has been appointed chief engineer, Engine division.

—o—

J. M. Tucker, who recently joined Massey-Harris Co., Racine, Wis., as assistant to the vice president and general manager, has been appointed general sales manager. Mr. Tucker and **C. E. Krause,** secretary and director of purchases for the company, have been appointed to the board of directors.

OBITUARIES . . .

Albion James Wadhams, 68, a vice president and manager, Development and Research division, International Nickel Co. Inc., New York, died Aug. 22 in Elizabethtown, N. Y.

—o—

Dr. Frank Waldo Merritt, 61, chief surgeon for Carnegie-Illinois Steel Corp. in Gary, Ind., for the past 22 years, died there Aug. 18.

—o—

Adolph W. Meyer, 73, president, Watervliet Iron & Brass Foundry, Watervliet, N. Y., died in Albany Aug. 19. Mr. Meyer was one of the founders of Watervliet Iron & Brass Foundry in 1924.

—o—

Raymond S. Dean, 59, president, R. S. Dean Co., Chicago, died Aug. 22 in that city.

—o—

Irving Weiss, 44, president, Port Huron Brass Foundry Co., Port Huron, Mich., died Aug. 22 in Cleveland. An expert in light metal casting, Mr. Weiss is said to have been the first in the nation to cast beryllium.

—o—

Robert B. King, 45, general superintendent of construction at the assembly plant which Austin Co., Cleveland, is building northwest of Chicago for Douglas Aircraft Corp., died Aug. 15 in Royal Oak, Mich.

—o—

Joseph R. Moffat, 52, superintendent of the second shift, Chevrolet Motor & Axle division, General Motors Corp., Tonawanda, N. Y., died Aug. 19 in Buffalo. Mr. Moffat had been associated with Chevrolet for 33 years.

—o—

Thomas Gerardi, 53, president, Rinelli & Gerardi Marine Contracting Co., Brooklyn, N. Y., died Aug. 18 in that city.

Chile Plans Steel Plant with 100,000 Ton Annual Capacity

New mill to supply two-thirds of country's requirements. Will roll reinforcing, light structurals, thin plates and sheets, strip and have wire drawing facilities

CHILE, long a supplier of high-grade ore to United States steel producers, now is planning construction of a steel plant to produce 100,000 metric tons a year, or two-thirds of the country's annual consumption.

It will be located in the Concepcion region, in the southern part of the country.

From plans now being prepared by Corporacion de Fomento, with main offices in the United States at 120 Broadway, New York, equipment will be installed to roll reinforcing steel, light structural shapes, thin plates and sheets, strip for making welded pipe, and facilities for drawing wire.

Cheap hydroelectric power is available. However, there are complications with respect to metallurgical coke. Electric blast furnaces of the Swedish Tysland-Hole type, will be constructed—two, each with a daily capacity of 100 metric tons. Other equipment will include a bessemer converter, electric steel furnaces, a mixer and by-product coke ovens.

Corporacion de Fomento plans to have the plant in operation by either late in 1945, or early 1946.

Use of electricity for the smelting of iron ore, as indicated, was decided upon chiefly for two reasons: Abundance of cheap hydroelectric power in Chile; the grade of coal to be had in that country. Chile has the largest coal mines in South America, producing about 2,000,000 metric tons annually. It is a bituminous coal, good for domestic heating but not well suited for metallurgical purposes. Tests are now being run in the United States in an effort to develop a good metallurgical coke.

As for iron ore and limestone, Chile is in good position. For many years, Bethlehem Steel Co. has been obtaining high grade iron ore from the El Tofo region in northern Chile.

Fomento has purchased the 32 by 72-inch sheet mill installed by the Worth Steel Co., Claymont, Del., in the early thirties but not operated during the past few years. This unit will be used for rolling sheets and light plate and will be equipped with galvanizing facilities.

Mexican Nonferrous Mining Spurred by War

Mineral and metal mining in Mexico has been sharply accelerated in the past year to help supply the United Nations' war industries, according to a report by the Co-ordinator of Inter-American Affairs.

Zinc, manganese, antimony, tungsten, copper, fluorspar, mercury and graphite, are all moving in heavier volume to the United States as a result of this war effort. While exact figures were not revealed, it was said that ore concentrates shipped amount to "hundreds of thousands of tons".

Expanded Mexican production is taking place under an agreement signed last year between Mexico and the United States for development of strategic resources. The United States is the chief market, and is helping with loans, technical advice, and transportation problems.

Mexican Tungsten Industry Modernized

TUNGSTEN production in Mexico has been modernized under stimulus of North American war demand.

Needed in producing armor plate, and high-speed tool steel, among other products, much of Mexico's output is brought in by small, scattered mines under minor operators in the northwestern part of Mexico. Formerly these operators mined the metal for what they could get from traders.

Metals Reserve Co has an agency in Nogales, Mex., under charge of K. C. Li, president of the Wah Chang Trading Co. (China was the prewar normal source of tungsten for the United States and other countries) and Mr. Li is credited with being most familiar with the tungsten industry.

The agency offers uniform prices under a stabilized buying system, as an inducement to the small operators.

They Say:

"After the war we of the American Federation of Labor want to see the vast majority of jobs provided by private employers rather than by the government."—**George Meany,** secretary-treasurer, American Federation of Labor.

• • •

"Mechanized warfare apparently has not diverted the interest of the service men from the humanities to science or technology."—**Dean Nicholas McD. McKnight,** Columbia university.

• • •

"Defeat of the Axis will be but an episode in our continuing struggle for a better, fuller, more secure life for the average citizen. Our country must face the questions of peace, and must face them inspired by the same faith that will carry us to the total defeat of the enemy on the battlefield."—Supreme Court Justice **Hugo L. Black.**

• • •

"The corporate form of organization is essential in a democratic country like the United States for carrying on, not only of large scale business, but also many types of small scale business."—**Vice President Wallace.**

• • •

"In breathing spells we dig in on postwar plans, and are trying to keep in a position to convert quickly to peacetime needs. We will want to get the television quickly, as will many other units in the radio industry. We are prepared to make it, we know how to make it, we have made it, we expect to make it."—**Eugene A. Tracey,** president, Majestic Radio & Television Corp., Chicago.

• • •

"While we can be optimistic about the course of the war there can be no complacency over our manpower situation." **Paul V. McNutt, chairman War Manpower Commission.**

• • •

"Steel consumers should hold inventories at the lowest level consistent with efficient operations, cancel tonnage not needed for current requirements and return unneeded allotments." **John T. Whiting,** director, Steel Division.

Ordnance Depot Taken Over by Harvester Co.

Newly formed subsidiary of International operates Army depot at Rossford, O., beginning Aug. 29

OPERATION of the Rossford Ordnance Depot, Rossford, O., was taken over from the Army by The Harvester War Depot Inc., wholly-owned subsidiary of the International Harvester Co., on Aug. 29.

The private operating company will offer employment to all present employes of the government-operated depot.

Change from Army Ordnance operation to private industry operation at the Rossford Depot is in keeping with a policy announced by the Army to place operation of a number of ordnance depots in the hands of private industries.

This arrangement was entered into by The Harvester War Depot at the request of the Army. The company will receive for its services only a very small fixed fee. After the International Harvester Co. received the request from the Army, it organized the subsidiary company, The Harvester War Depot Inc., for the purpose of operating the depot.

Fourth of Rail Freight Provided by Steel Mills

Nearly one-fourth of the freight tonnage hauled by American railroads in 1942 was either raw materials for steel plants for products of the mills, according to the American Iron and Steel Institute.

Last year the carriers hauled a total of approximately 1,421,000,000 tons of freight of all kinds. Of that total, 251,000,000 tons consisted of iron ore and other steelmaking materials en route to steel plants. An additional 76,000,000 tons consisted of shipments of iron and steel products from the steel mills to consumers.

37,000 Women in Steel Plant Jobs

Manpower shortages caused by withdrawals of men into the armed services have caused employment of women in steel plants to be increased 15 times over prewar levels. Currently almost 37,000 are working in the plants in addition to about 27,700 employed in offices. They account for about one-tenth of total steel industry employment.

Women have been found capable of handling a wide variety of plant jobs, such as operating cranes, serving as helpers on rolling mills and in open hearth departments, inspecting steel products at various stages of manufacture, running lathes and other machine tools, operating heating furnaces and driving tractors and trucks.

Before the war, inspecting sheets of tin plate was almost the only job on which they were employed.

Shorter Bayonet Saves 362 Tons of Steel in '43

American combat troops on all fronts are being issued a new, shorter, bayonet, with a consequent saving in steel at home. The new bayonet is ten inches long, instead of 16, as formerly, but retains the same shape as the old type, and is said to be handier.

It can be used as a trench knife, and is said to have been welcomed especially by jungle troops, paratroopers and airborne infantry units. Saving in steel amounted to 362 tons of high-carbon type from estimated 1943 production, and for 1944, it is expected will amount to 500 tons.

Wickwire Spencer Steel Employs 78% More Women

Employment of women in the production departments of Wickwire Spencer Steel Co., New York, increased 78 per cent during the past year. A comparable increase was made in the office staffs.

BRIEFS . . .

United States Spring & Bumper Co., Los Angeles, pioneer Pacific Coast fabricator and heat treater of spring steel, has been presented the Army-Navy "E" for its part in the production of war equipment.

—o—

Inland Steel Co. announces that five blast furnaces at Indiana Harbor have maintained uninterrupted production for more than three years in what is believed to be a group continuous operational record.

—o—

Hall Machinery of Canada Ltd. has been formed by R. E. Stewart of Stewart Construction Co. Ltd., Sherbrooke, Quebec, and F. C. Manning, Halifax, N. S., and has bought the Hall Machinery Co., Sherbrooke. Present war contracts will be carried out and regular line of manufacturing will continue, including special mining equipment, mine cars, electric shovels and similar equipment.

—o—

National Electrical Manufacturers Association announces that its Industrial and Commercial Lighting Equipment section will sponsor a postwar annual lighting and equipment exhibition and congress shortly after the war.

—o—

Alvey-Ferguson Co. of California has established facilities in Los Angeles to manufacture conveying equipment and metal products cleaning and finishing equipment similar to products manufactured by the company in Cincinnati.

—o—

Thomas Machine Mfg. Co., Pittsburgh, expects to complete improvements totaling $200,000 by the end of August, George P. Thomas, president, announces. Work includes installation of additional machine tools, handling facilities, and additions to buildings.

—o—

Brainard Steel Corp., Warren, O., has opened offices for the Michigan area at 416 New Center building, Detroit. Julian L. Gailey will be district sales manager.

—o—

Eisler Engineering Co., Newark, N. J., has issued a 28-page illustrated catalog describing the specific line of small spot welding machines manufactured by the company. An eight page bulletin listing available types of small and heavy duty butt welders has also been published.

—o—

Watson-Standard Co., Pittsburgh, announces use of substitutes for war scarce materials in producing a series of coatings. New coatings contain no tung oil, phenolic resin, or other critical material.

—o—

George S. May Co., Chicago, is distributing new device, called the "Deduct-O-Graph", which automatically shows proper payroll deductions for any employe when properly set. It is available to industrial companies upon request.

—o—

Pullman-Standard Car Mfg. Co.'s employes in the Chicago plants have set an all-time record in the firm's 20-year old suggestion plan by turning in 206 award winning ideas in the last three month period.

—o—

Worthington Pump & Machinery Corp., Harrison, N. J., announces the location of its advertising department at 744 Broad street, Newark 2, N. J.

ELECTRIC POWER SPARKS IN GROWTH IN NORTHWEST

By A. H. ALLEN
Associate Editor, STEEL

NO REVIEW of the West Coast, 1943 model, would be complete without reference to electric power, and here the story is intimately related to the vast government-sponsored hydroelectric projects—Boulder dam in the south, Shasta dam in central California, the Columbia river projects in the Northwest, plus numerous other smaller units.

To get an idea of generating capacity, consider the following list which includes hydroelectric projects in the East for comparison:

	Kilowatts
Boulder dam	1,300,000
Shasta dam	450,000
Columbia river projects (Bonneville, Grand Coulee, Rock Island)	2,700,000
Niagara Falls	1,200,000
TVA	1,900,000
Planned Colorado river Projects	1,600,000
Planned Columbia River Projects	10,300,000

The old story of power from government-built hydroelectric plants vs. private power from steam generating plants is very much debated on the West Coast as elsewhere. It simmers down to this. Government projects do not have to carry the 25 per cent tax load of private plants, and hydroelectric plants do not consume a natural resource like coal or oil. These outweigh the fact that, operating on an equal basis, steam generated power probably can be supplied at a lower cost than hydroelectric power, figuring in the cost of the relative investment, taxes, etc.

Columbia river power costs about 25 per cent less than electric power in San Francisco or Los Angeles, despite the fact that the Los Angeles power may come from Boulder dam. Rates in Los Angeles and San Francisco are about a par, the latter being supplied by Pacific Gas & Electric Co., whose system is fed by both steam-generated and hydroelectric power. Industrial users are now being offered Columbia river power at rates far below those of the private utility in Portland for example, the Portland General Electric Co., but are based on a minimum yearly consumption.

Pacific Gas & Electric, which provides most of the power used in central and northern California, estimates that in 1942 its system supplied 600 million kilowatt-hours to new or enlarged war industrial plants and to military establishments, six times the consumption of 1941 in defense plant preparation. The figure covers service to additional or extended plants and to bases of the armed forces.

Since it requires 22,000 kilowatts to produce 2000 pounds of aluminum, it is easy to understand the centering of aluminum reduction plants in the Northwest, where one-third of all aluminum production in the country is now concentrated in plants representing an investment of $125,000,000 and employing 10,000. Adding to this capacity, there are two new plants in the Los Angeles area costing about $50,000,000. By December of this year, it is reported that aluminum production in the entire country will be at a rate of almost two billion pounds or nearly one million tons a year.

Bauxite Reduced To Alumina

Aluminum Co. of America operates the principal reduction plants in the Northwest and in Los Angeles. Reynolds Metal and Olin Corp. also operate plants in Washington, all using bauxite as a raw material which must be reduced to alumina before being shipped an appreciable distance to the plants. Alcoa has a plant with five pot lines giving 180,000,000 pounds yearly capacity on a 50-acre site near Vancouver, Wash., the plant employing 1500, and being financed by the company. A second plant, DPC financed, with four pot lines is located 14 miles from Portland at Troutdale on the old Sundial Ranch.

Near Troutdale there once was a very fine peach orchard, covering some hundreds of acres. A year or so ago, the Defense Plant Corp. bought 100 acres of this orchard, ostensibly for a site on which to erect a rolling mill. Contractors' crews descended onto the scene, ripped out thousands of trees and suddenly the project was dropped. For some strange reason the rolling mill had been shifted to Spokane, where it is now in operation, and the razed peach orchard is now nothing but a trailer camp, although

Grand Coulee dam is one of several power developments vitalizing Pacific Northwest industry

KS INDUSTRY

ST

War exerts tremendous influence for expansion in area but basically electricity from the great Grand Coulee and Bonneville dams provides driving force for economic growth of region in metal reduction, shipbuilding, and airplane building

there were plans afoot in May to persuade Alcoa and government officials to locate an extrusion plant on the site, principal difficulty being to find some building to house the extrusion presses.

Close by the Alcoa operations in the Northwest are extensive deposits of aluminum clays which might be used as a raw material should the supply of bauxite run out. Alcoa is not at all convinced that these clays can be used successfully, but if a suitable process could be worked out it would avoid the present long hauls on alumina from the Gulf Coast ports and preparation plants in Arkansas.

Electric power is the tonic which has vitaminized the industrial blood of the vast Pacific Northwest, flowing from its triangular heart bounded by Seattle, Spokane and Portland, Oreg. War industry, too, of course has had its pulsating effect, but basically it is electricity from the great dams at Grand Coulee and Bonneville on the Columbia River which is at once the driving power for industry today and the hope of industry here in the postwar world.

Power naturally is closely allied with the metal industries, ferrous and nonferrous, and already it has brought the great new aluminum reduction plants to Tacoma, Spokane, Longview and Vancouver, Wash., and Troutdale, Oreg. Shortly it may magnetize new aluminum and magnesium industries to the area.

For example, the new Oregon Electric Steel Rolling Mills at Portland plans eventual production of 75,000 tons of steel ingots annually, all of which will be rolled on merchant mills being installed at the plant. Sizable stocks of choice shipyard scrap have been accumulated at the plant.

Electric power and the war have combined to give impetus to such important operations as now are under way at Pacific Car & Foundry Co. in Seattle where production of medium tanks has been

Lumber industry of the region sees important possibilities in postwar era

in process more than a year.

With the assistance of 348 subcontractors, this plant is building a tank weighing 32 tons, of which 70 per cent represents steel produced from Northwest scrap. Before the war, the Pacific Car plant was building trolley coaches, buses and railroad equipment. Now it is almost entirely on war work, principally tanks. Among the company's new facilities is a large electric steel foundry.

Power drives the sawmills of Washington and Oregon which have long lent to the district the reputation of lumber center of the country. A by-product has been the pyramiding of production and demand for plywood, so intensive that the Portland area now supplies an estimated 2,500,000,000 feet of plywood a year, based on ⅜-inch 3-ply material.

Power has brought the Northwest important new electric steel foundries, practically all of them now busy on Navy work altogether, but some of them certainly destined for an important postwar role.

Aircraft and shipbuilding are two other "war babies" which have zoomed to major significance with the war. Four plants of Boeing Aircraft Co. sprawl over the south and east sections of Seattle, while two more are producing planes for Canada in Vancouver, B. C. Boeing is no newcomer to the airplane field, having celebrated its twenty-fifth anniversary two years ago, but only in recent years has it attained its present stature. It is the breeding ground of the famed B-17 Flying Fortress, Strato-liners and other new planes as yet unveiled.

Boeing Aircraft has two main divisions, one at Renton on Lake Washington near Seattle, and the other in Seattle, the latter extending over several plants, one an old Fisher Body plant.

The Renton division was built originally to turn out the Sea Ranger, a two-motor patrol bomber for the Navy, but is now being equipped for a different plane, the nature of which cannot yet be disclosed.

Boeing Making Postwar Plans

Deliveries of B-17 Flying Fortresses in 1942 increased better than eight times over 1941, and the schedule this year will be boosted still further.

Boeing is actively though quietly planning for the postwar period. This is brought out in the company's annual report, in which it is stated that—"Plans for postwar operations are being developed to the best of the company's ability. Research in aircraft design as well as studies of possible non-aircraft products which could be developed by the company's engineering talent and manufactured by its facilities are being conducted by a special division of the engineering department.

Additional research studies, market analyses and surveys are being conducted by an independent agency. These studies have been undertaken to better equip the management with information on which to base important decisions that will confront the company in the postwar future.

Along this line of thinking is what Boeing calls a "conservative national campaign of institutional advertising," the object of which is to acquaint the public with the company's accomplishments and with its varied engineering and manufacturing talents and experience which will be reflected in any future product to be offered for sale under the name of Boeing.

Concentrating On Warplanes

Engineering activity still is concentrated on aircraft for war purposes and numerous changes have been made in the B-17F Fortress model.

Boeing has increased its engineering field service activities, including the sending of engineers overseas to all combat zones where the Flying Fortresses are in action. Fundamental flight research likewise has been pressed and construction now is well along on one of the most modern wind tunnels and aeronautical laboratories in the industry.

If past history is any indication, Boeing will be in there plugging when the war orders have dwindled. For one thing, it has the experience of the last war to fall back on, when the sudden cancellation of airplane orders forced the company to turn its woodworking crews to the building of bedroom furniture and sea sleds. With the help of a large and aggressive crew of engineers it should be able to turn its welders, riveters and metalworking crews to products required by a starved civilian economy.

The company has moved a long way since the day in 1916 when William E. Boeing and a few associates started an "aeroplane" shop on the shores of Seattle's busy Lake Union, ostensibly for the purpose of repairing a damaged seaplane. Today Mr. Boeing has retired to the obscurity of a company consultant, but his namesake rolls on.

Shipbuilding is at fever pitch in the Northwest, both in Navy yards at Bremerton and in private yards building for the Navy and Maritime commission. R. J. Lamont, president of Todd Shipbuilding & Dry Dock and the Seattle-Tacoma Shipbuilding Corp., believes that an important industry will continue even after today's war-inflated yards have had the pressure removed, principally because the Pacific Northwest is closest to Alaska and to the Orient. Ships will be required to maintain a sturdy defense of the Pa-

cific Coast and to handle increased commercial and industrial life in Alaska. Russian development of the Siberian territory, Lamont suggests, also may mean much for postwar shipping from the Northwest.

Lamont declares, "Puget Sound will emerge from this war with the most extensive peacetime call on this industry that it has ever experienced; that's what we're planning for."

Probably the most amazing emergency housing development on the West Coast is the Vanport project, near Portland, which was recently completed. Here on what was once virtually swamp land, living accommodations for 40,000 persons, including 9600 housing units, stores, schools, parks, police and fire departments—a whole new city—have been erected to house workers at the Kaiser Vancouver shipyard, itself built up on "made land" pumped from the bottom of the Columbia river.

Lumber always has been an outstanding natural resource of the Pacific Northwest. Hitherto abundant this natural resource today is showing the effects of the age-old policy of wasteful utilization and as the age of waste draws to a close important postwar possibilities for the lumber industry loom ahead.

The great Douglas fir belt for Oregon and Washington, one of the two principal "lumber yards" of the country, is estimated to encompass about 600 billion board feet which grows at a rate of 3 billion board feet a year but at the same time slips back 9 billion feet by virtue of timber cutting.

Accelerated Wood Industry

Developments in wood chemistry, plywoods, pulp and paper, and related products, plus a vastly more intelligent forest management, are combining to sketch the outlines of an accelerated and efficient industry based on wood. Thirty mills in the district are manufacturing plywood, about 10 per cent of it so-called "exterior" plywood using the hot-press method with synthetic resin glues, and the rest "interior" board made by the cold press method with protein glues.

Looking into the future, prospects for Pacific Northwest industry are seen centering around hydroelectric power. In a recent address, Ivan Bloch, chief, market development section, Bonneville Power Administration, said the Pacific Northwest in the short period of two years, has undergone tremendous changes and that by the end of the war the population of the region will have increased by about one-half million. Its labor force will have increased by 50 per cent and the income of the region will have risen from about $2,000,000,000 to $4,000,000,00 a year. Nearly 400,000 of the area's men will be in the armed service.

These shifts have been caused by the war, he said, and when peace comes new shifts will occur. For example, for the states of Oregon and Washington probably about one-third of the population is engaged in war work.

Many of those in the shipyards and other local war industries have come from other points. What will become of them? This is the greatest problem of postwar readjustment facing the area, in the opinion of Mr. Bloch, and although it will be faced throughout the nation, in proportion the problem of the region of the Pacific Northwest area will be greater. The only way to meet it, he said, is to provide now for a basis of wider employment opportunities in regional enterprises. This necessitates development of a program which will enable conversion of wartime industry in the area to peacetime production.

(This is the third article of a series. The fourth will be presented next week.)

Boeing airplane plants at Seattle and Vancouver are the breeding grounds for the famed Flying Fortresses. Postwar plans seen assuring aircraft industry promising future

THE BUSINESS TREND

Complacency Only Minor Factor in Output Lag

NOT "complacency" over good war news, but rather lack of manpower, material shortages, and design changes are the chief reasons given by 600 manufacturers for failure of war production to attain projected schedules.

Revised draft deferment regulations in an effort to induce workers into essential jobs and the tightening of federal controls over employment in order to direct the movement and placement of labor is being counted on by the War Production Board to push production above the present high plateau of the past few months.

In some instances critical expansion programs have been held up, for there is no point in building new facilities when there isn't enough labor available to operate existing production capacity to the limit.

Freight car construction schedules may be held up to some extent because of difficulty in getting steel. Some observers feel there should be sufficient plates, but other needed products may be hard to obtain on schedule.

WPB states the program scheduling in the heavy steam locomotive parts manufacturing field has resulted in assurances from this group that the demand for an unprecedented 200 per cent increase in production in 1944 would be met.

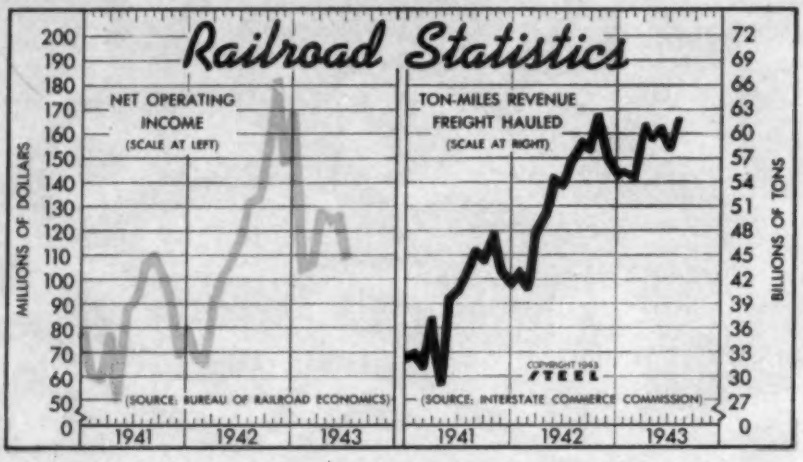
Class I railroads had 27,795 new freight cars on order Aug. 1, compared with 36,453 on the same date last year. A total of 12,030 new freight cars were placed in service during the first seven months this year, against 51,606 in the like 1942 period.

Ton-miles of freight handled by Class I carriers in the seven months ended July 31 was 18.7 per cent greater than in the like period last year; 62 per cent more than in the same months of 1941 and 138 per cent above the total for the corresponding period of 1939.

Freight priorities policy is being considered by some government agencies, whose officials fear the railroads will not be able to cope with the peak autumn traffic due to lack of locomotives and rolling stock.

Railroad operating revenues for the first half this year were up 22.1 per cent compared with a year ago, while operating expenses increased 17.6 per cent.

FOREIGN TRADE—Reflecting improved shipping conditions United States exports during the second quarter increased 40 per cent and imports 18 per cent above the initial three months this year.


Railroad Statistics
NET OPERATING INCOME
(SCALE AT LEFT)
TON-MILES REVENUE FREIGHT HAULED
(SCALE AT RIGHT)
MILLIONS OF DOLLARS
BILLIONS OF TONS
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 0
72 69 66 63 60 57 54 51 48 45 42 39 36 33 30 27 0
1941 1942 1943
1941 1942 1943
(SOURCE: BUREAU OF RAILROAD ECONOMICS)
(SOURCE: INTERSTATE COMMERCE COMMISSION)
COPYRIGHT 1943 STEEL

For the first half this year exports were the largest in the country's history. The Commerce Department reports exports in this period of $5.5 billion were 57 per cent above the $3.5 billion during the like 1942 months, and exceeded any full year total during the 20-year period 1921-41. Figures for the last two years exclude shipment to the armed forces abroad but include lend-lease goods, which were by far the largest of any item reported in the totals.

June exports declined 6 per cent from the record May total, but exceeded one billion dollars for the second consecutive month and represented a 55 per cent gain over the June 1942 total.

Imports during June registered the sixth consecutive monthly gain. First half import total of $1.6 billion was 9 per cent more than for the corresponding months last year.

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	98.5	98.5	98.0	97.5
Electric Power Distributed (million kilowatt hours)	4,265	4,288	4,196	3,674
Bituminous Coal Production (daily av.—1000 tons)	2,017	1,958	1,983	1,896
Petroleum Production (daily av.—1000 bbls.)	4,218	4,239	4,119	3,972
Construction Volume (ENR—Unit $1,000,000)	$41.6	$31.8	$49.0	$230.7
Automobile and Truck Output (Ward's—number units)	19,820	19,800	20,130	20,200

*Dates on request.

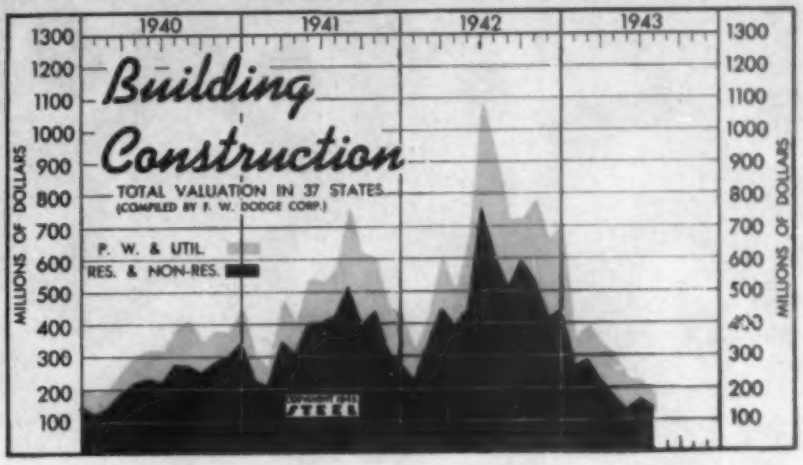
TRADE				
Freight Carloadings (unit—1000 cars)	930†	887	883	869
Business Failures (Dun & Bradstreet, number)	60	51	48	174
Money in Circulation (in millions of dollars)‡	$18,241	$18,101	$17,706	$12,956
Department Store Sales (change from like week a year ago)‡	+6%	+11%	−1%	−5%

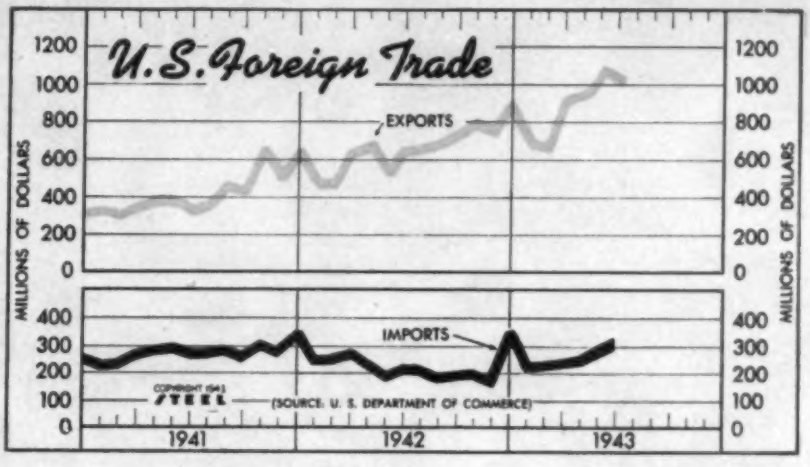
†Preliminary. ‡Federal Reserve Board.

Construction Valuation In 37 States

(Unit—$1,000,000)

	Total	Public Works-Utilities 1943	Public Works-Utilities 1942	Residential-Non-Res. 1943	Residential-Non-Res. 1942
Jan.	350.7	85.8	90.8	264.8	226.0
Feb.	393.5	112.9	95.9	280.5	337.6
Mar.	339.7	123.0	159.7	216.7	451.1
April	303.3	127.7	101.7	175.6	397.0
May	234.4	95.8	227.7	138.6	445.8
June	229.6	73.3	436.4	156.3	753.8
July	183.7	50.0	327.3	133.7	616.4
Aug.	.....	.....	213.1	.....	507.9
Sept.	.....	.....	129.6	.....	593.6
Oct.	.....	.....	246.2	.....	534.2
Nov.	.....	.....	241.0	.....	413.2
Dec.	.....	.....	271.0	.....	437.7
Total	.....	.....	2,540.4	.....	5,714.3





Foreign Trade
Bureau of Foreign and Domestic Commerce

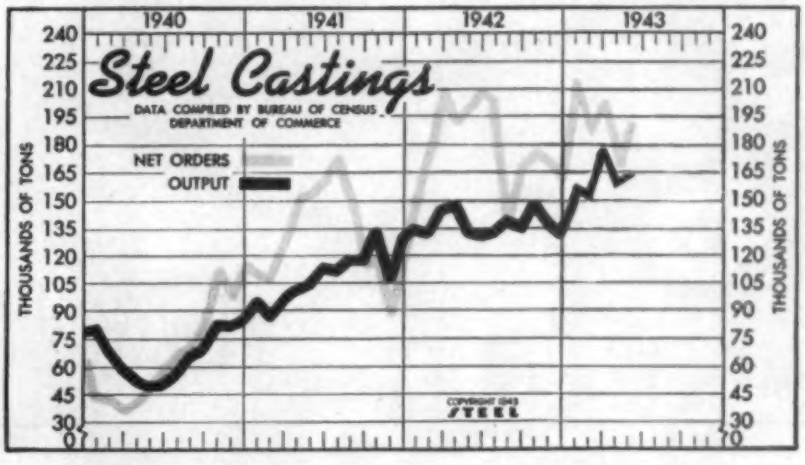
(Unit Value—$1,000,000)

	Exports 1943	Exports 1942	Exports 1941	Imports 1943	Imports 1942	Imports 1941
Jan.	751	479	325	228	253	229
Feb.	732	478	303	234	253	234
Mar.	984	611	357	248	272	268
Apr.	963	695	385	257	234	287
May	1,069	525	385	281	191	297
June	1,004	618	330	302	215	279
July	...	627	359	...	214	278
Aug.	...	694	455	...	184	282
Sept.	...	718	417	...	196	263
Oct.	...	776	666	...	199	304
Nov.	...	750	492	...	174	280
Dec.	...	853	651	...	356	344
Total	....	7826	5126	....	2743	3345

Commercial Steel Castings

(Net tons in thousands)

	Orders 1943	Orders 1942	Production 1943	Production 1942
Jan.	213.1	150.5	154.7	134.8
Feb.	191.2	179.9	151.5	133.7
Mar.	202.7	211.1	176.5	146.5
Apr.	165.8	191.2	161.4	149.6
May	192.5	199.6	163.8	131.5
June	.....	208.9	.....	132.0
July	.....	202.3	.....	135.7
Aug.	.....	141.2	.....	139.2
Sept.	.....	177.5	.....	139.8
Oct.	.....	179.5	.....	152.1
Nov.	.....	173.3	.....	140.4
Dec.	.....	172.3	.....	143.9
Total	.....	2,187.3	.....	1,679.2



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—billions)	$8,335	$7,812	$8,612	$7,322
Federal Gross Debt (billions)	$147.3	$146.8	$144.4	$85.4
Bond Volume, NYSE (millions)	$34.1	$37.7	$61.8	$49.1
Stocks Sales, NYSE (thousands)	2,941	2,943	4,714	2,212
Loans and Investments (millions)†	$46,899	$46,954	$46,822	$33,603
United States Government Obligations Held (millions)†	$34,437	$34,464	$32,287	$19,509

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's, 15 items)†	245.2	245.3	244.2	231.3
Industrial Raw Materials (Bureau of Labor index)‡	112.3	113.5	114.0	100.8
Manufactured Products (Bureau of Labor index)‡	100.0	99.9	99.6	99.1

†1931 = 100; Friday series. ‡1926 = 100.

WELDING THE "BIG INCH"

"BIG INCH", our new oil pipeline from the Southwest, reached its eastern terminal at Phoenixville, Pa., late in July —only a few days short of a year from the day the first weld was made at Longview, Tex.—a record that may stand for some time.

The line is seamless steel pipe, 24 inches in diameter with walls ⅜-inch thick, assembled from various lengths bent and welded in the field. Constructed by War Emergency Pipelines Inc., at a cost of 93 million dollars, its capacity is 300,000 barrels of oil a day—equivalent to the daily delivery capacity of about 25,000 railroad tank cars. Distance from Longview, Tex., point of beginning, to Norris City, Ill., and on to Phoenixville, Pa., is 1388 miles. To fill this line with oil requires 4,000,000 barrels, equivalent to the total output of all oil wells in the country for a day.

Construction early developed into a 24-hour unremitting battle against mud, as much of the course through the first leg lay across swamps, flooded rivers or in generally difficult terrain. Mud clogged machinery dogged the movements of work gangs. Welders and other workers were frequently in mire up to their hips. Trucks had to be pulled by tractors. Despite all this, an average of 5 miles of pipe went down every day.

Because of disadvantageous conditions, some novel construction techniques were uncorked for the first time. Officials of Johns-Manville Corp., responsible for providing suitable covering to protect the pipeline against corrosion, report one innovation as a conspicuous example.

Usual method of employing ditching machines in pipeline excavation is to use two ditchers in tandem, each working on its designated section. This leads to much lost time and needless wear and tear on the machines because of the necessity of "roading" the equipment that has completed its section around the ditcher working ahead of it. But Oklahoma Contracting Co. eliminated this needless "by-passing" by having the first machine cut only the upper half of the trench, followed by the second machine cutting the lower half of the same trench. This allows much more ground to be covered by the ditching machinery, since both ditchers operate continuously. No matter how fast the line-up and tack-welding crews moved up with the line, the trench was ready for them.

That the pace of construction was swift

Fig. 1—A section-building gang lines up length of pipe which then will be clamped and tack welded, ready for roll welding. The long sections are easily handled by specially rigged tractors

Fig. 2—An operator completes assembly of a section, usually consisting of three lengths of pipe each about 40 feet long, with a continuous roll weld

Fig. 3—Two tractors are shown carrying a 150-foot section to the end of the main line for tying-in

New pipe-laying and welding methods lead to a 5-mile-per-day pace in construction of world's largest, longest oil pipeline from Texas to the East Coast

may be seen from the accompanying illustrations furnished by Lincoln Electric Co. They show some of the methods used by the contractors to expedite the job. Procedure in constructing and laying a typical section of the pipeline will be detailed.

Section-building gangs, working far enough ahead of assembly operations on the main line to insure uninterrupted progress of line welding, prepare 120 to 150-foot sections of the "Big Inch" in advance. Each section is made up of a number of short lengths of pipe welded together.

Work is divided into two sets of operations. One gang tacks and welds the pipes to form the long sections; a second gang ties the section into the line. Several gangs are employed in making up the long sections since this work involves making three welds as against one required to tie in the section.

On a convenient site adjacent to the surveyed line for the trench, temporary piers of structural timbers are built up to knee-height at intervals of approximately 30 feet. When these are lined up, a double-truck pipe dolly is mounted on top of each pier as needed. A Caterpillar tractor, especially rigged with a boom anchored to its frame to enable it to handle the pipe, lifts a length—approximately 40 feet—upon a pair of dollies. It then picks up another length and swings it into position at the end of the first piece. Still suspended from the tractor boom, the second pipe is slowly jockeyed back until the beveled ends of the two pipes are snugly together. At this point a heavy steel pipe clamp is put on, as shown in Fig. 1, and locked over the joint preparatory to tack welding.

The clamp consists of two steel rings somewhat larger in diameter than the pipe with flanges on the inside periphery to strengthen them. Square steel cross bars, serving as transverse spacers, are underneath the flanges between lugs which project inward from the rings to grip the pipe when clamp is closed. The spacers correspond in thickness to the length of the lugs, giving equal surface contact with both of the pipe ends being joined. The lugs also help to distribute the stresses in the locking rings more evenly.

The clamp is hinged opposite the quick-acting toggle lock to permit easy dismounting and removal to the next position, a hook connection, Fig. 4, opening readily after the joint has been completed.

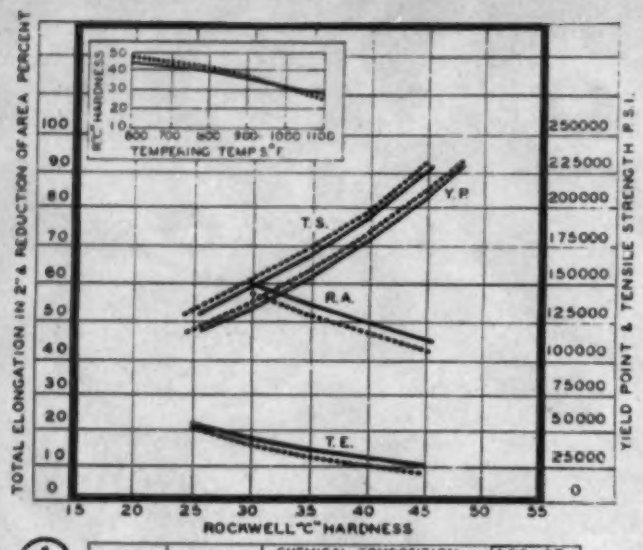
In lining up a joint, the clamp is placed on the fixed pipe section (the one on the dollies) and positioned so a portion of the cross bars extends past the pipe end. Then the section being held by the tractors is swung to fit inside these cross bars and is lined up as accurately as

(*Please turn to Page* 96)

Fig. 4—Another section is tied-in to the "Big Inch". Crewman with sledge, left, is hammering on cross bars of a pipe clamp to drive it over the end of the fixed section and extend its grip equally to both sections. This done, the new section is aligned with the old, clamp is locked and welding then begins

Fig. 5—As members of the gang stand on both sections to help line them up, an operator makes the first tying-in weld. New sections remain suspended from tractor booms until weld is completed

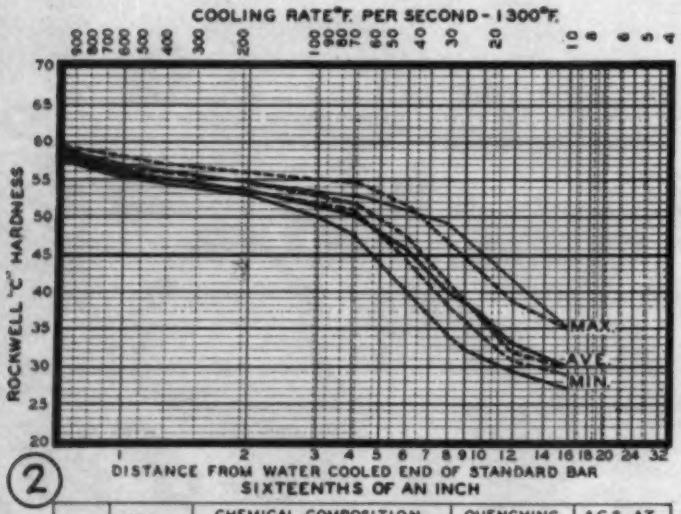
Fig. 6—Two operators make final roll welds joining a new section to the main line



①

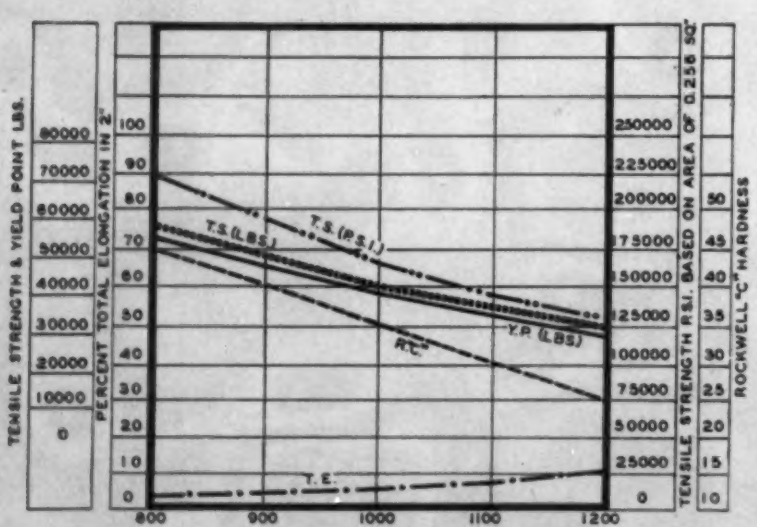
CODE	STEEL	CHEMICAL COMPOSITION C.	MN.	Si.	Ni.	CR.	MO.	A.G.S. AT 1700°F.
———	3140	.41	.84	.19	1.27	.69	.12	FINE
·-·-·-·-·	9440	.42	1.08	.48	.35	.29		

OIL-QUENCHED FROM 1550°F. IN 0.525" TEST BAR SIZE



②

	STEEL	CHEMICAL COMPOSITION C.	MN.	Si.	Ni.	CR.	MO.	QUENCHING TEMPS °F.	A.G.S. AT 1700°F.
MIN.	———	.41	1.02	.47	.39	.29	.13	1550	7
MAX.	9440	.43	1.04	.50	.35	.37	.13		7
AVE.	10 HEATS	.41	1.08	.48	.35	.32	.12		FINE
MIN.	———	.40	.74	.28	1.13	.60		1550	8
MAX.	3140	.39	.76	.24	1.38	.60			7
AVE.	16 HEATS	.42	.70	.23	1.26	.64			FINE



③

C. - .42 MN - 1.06 Si - .32 Ni - .38 CR - .38 MO - .18	AUSTENITIC GRAIN SIZE FINE AT 1700°F.	AS QUENCHED HARDNESS RC" 53-57
	CUT THREAD N.F.	QUENCHED IN OIL FROM 1550°F.

User Report No. 18

NE (National Emergency)

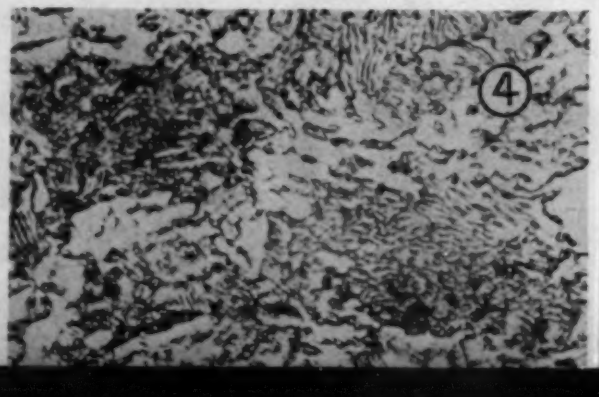
By A. S. JAMESON
Works Metallurgist
International Harvester Co.
Chicago

STEELS in the NE-9400 series with their lower nickel, chromium and molybdenum contents are becoming more extensively used than the NE-8600 series and thus are further contributing to the conservation of our alloy reserves. As they were added to the NE steel list later than the 8600 series, information on their properties and uses is not too plentiful. This article supplies data on the use of NE-9437 for alloy bolts formerly made from SAE-3100, 4000 and 4100 series steels. A preliminary survey of the tensile properties and hardenability of NE-9437 steel indicates that it could satisfactorily replace the standard alloy steels of a similar carbon content.

Fig. 1 compares the average tensile properties of A-3140 (SAE-3140) with those of five heats of NE-9437 or NE-9440 (9437 and 9440 have overlapping carbon contents and the same alloy range).

It will be noted from Fig. 1 that for all practical purposes the two steels have the same properties when heat treated by oil quenching and tempering to a hardness range of 25 to 40 rockwell C in 0.525-inch ASTM standard test bar size. This statement can be extended to cover all sections under 0.525-inch and also larger sections up to where complete hardening in quenching is obtained throughout the particular section hardened. The term "complete hardening" would mean here that a hardness of not less than 45 rockwell C was obtained

Fig. 1—Tensile properties based on rockwell C hardness of five heats of NE-9440 (dotted) vs. A-3140; ASTM 0.50-inch test bars
Fig. 2—Comparative hardenability of 16 heats of A-3140 vs. 10 heats of NE-9440
Fig. 3—Tensile properties of NE-9437 ⅝-inch N.F. bolts, based on tempering temperature
Fig. 4—Micrograph of lamellar pearlite partially spheroidized, etched in 2 per cent Nital, shown at 1000 diameters



perience with . . . .

ALLOY STEELS

NE-9437 as a Bolting Material

throughout the section after quenching.

The Jominy end-quench hardenability test can be used to predict the maximum bar size in which the requirement of "complete hardening" can be attained. Fig. 2 gives the minimum, maximum and average hardenability curves for 10 heats of NE-9437 or NE-9440 and 16 heats of A-3140 (SAE-3140) steel.

The chemical compositions shown in Fig. 2 opposite the minimum and maximum are the actual compositions of the heats which showed the highest and lowest values and are not necessarily the minimum or maximum ranges of the heats tested.

By using the cooling rates shown at the top of Fig. 2, the maximum bar sizes or uniform section in which "complete hardening" is obtained and therefore, tensile properties comparable with those shown in Fig. 1 can be calculated. See Table I.

As the majority of bolts for automotive use are less than 1 inch in diameter, the NE-9440 steel has the hardenability required to replace A-3140 or any other alloy steel of the same class.

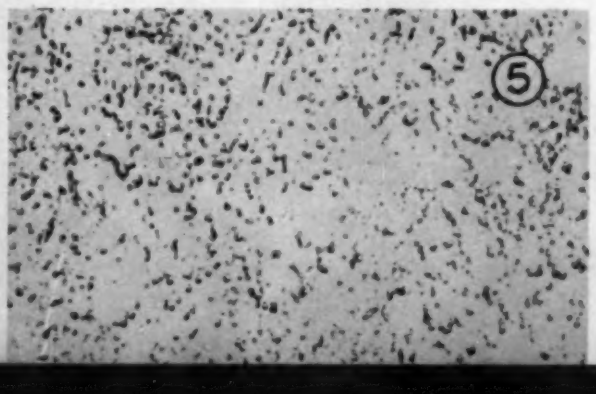
Physical Characteristics of NE-9437 Wire for Cold Heading: Specifications for wire for cold heading purposes usually include diameter tolerances of plus or minus 0.002-inch up to ½-inch and plus or minus 0.003-

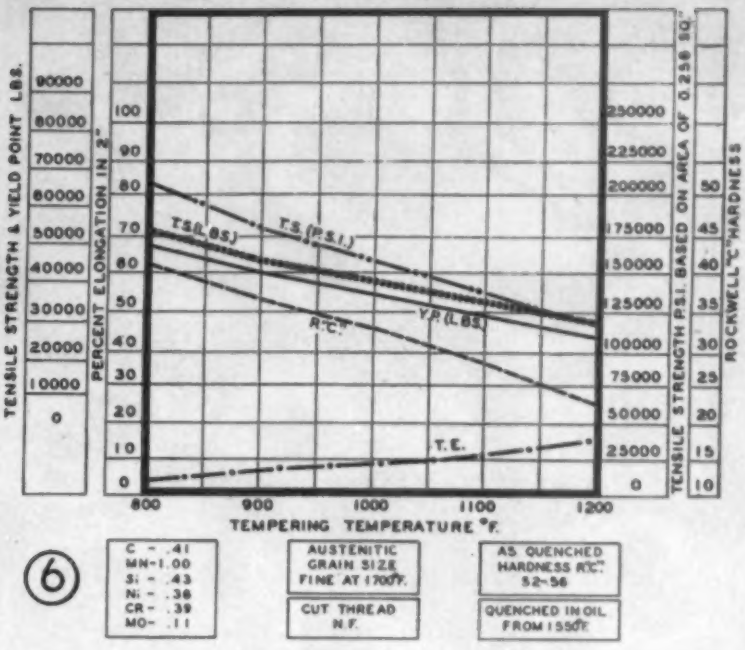
Fig. 5—Micrograph of spheroidized pearlite, etched in 2 per cent Nital, shown at 1000 diameters

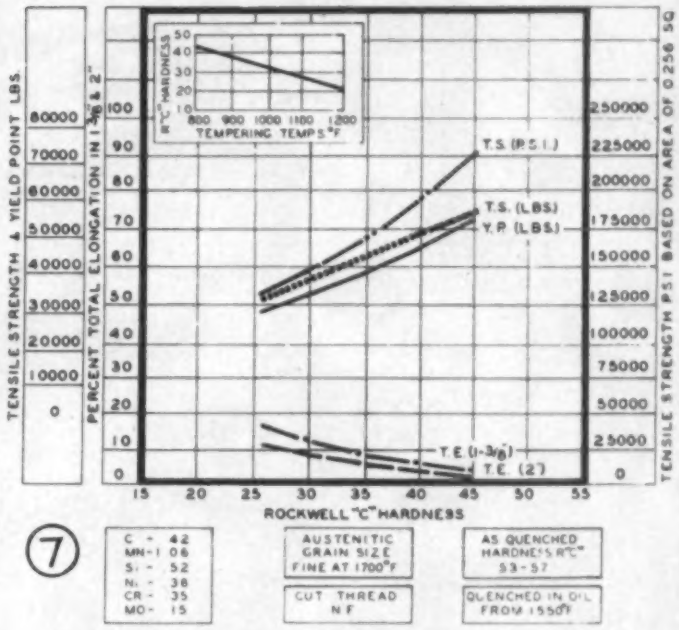
Fig. 6—Tensile properties of NE-9437 (of slightly different analysis than that in Fig. 3). Bolts were ⅝-inch N.F. and properties shown are based on tempering temperature

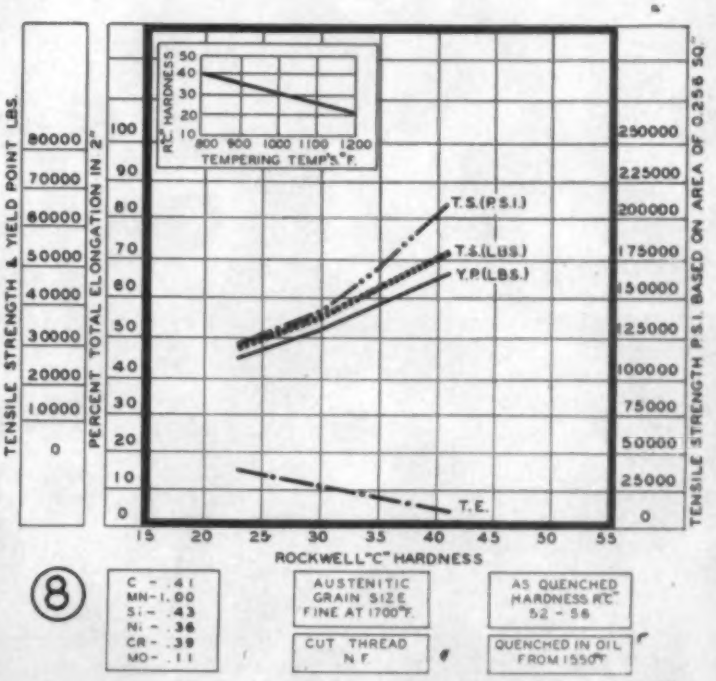
Fig. 7—Tensile properties of NE-9437 ⅝-inch N.F. bolts compared with rockwell C hardness values

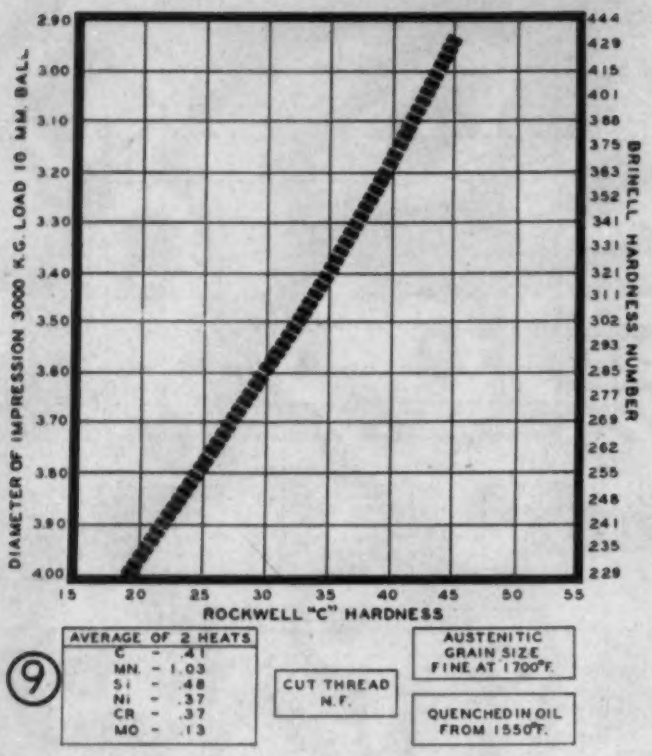
Fig. 8—Same as Fig. 7 except slightly different analysis

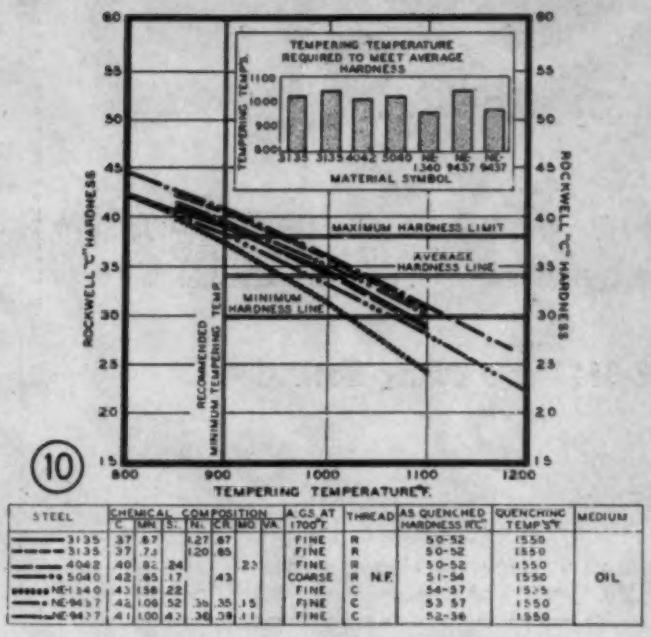












STEEL	CHEMICAL COMPOSITION C	MN	S.	NI.	CR	MO	VA	AGS AT 1700°F	THREAD	AS QUENCHED HARDNESS RC	QUENCHING TEMP'S °F	MEDIUM
3135	.37	.67		1.27	.67			FINE	R	50-52	1550	
3135	.37	.73		1.20	.65			FINE	R	50-52	1550	
4042	.40	.82	.24			.23		FINE	R	50-52	1550	
5040	.42	.65	.17		.43			COARSE	R N.F.	51-54	1550	OIL
NE-1340	.43	1.58	.22					FINE	C	56-57	1525	
NE-9437	.42	1.06	.52	.36	.35	.15		FINE	C	53 57	1550	
NE-9437	.41	1.00	.42	.36	.38	.11		FINE	C	52-56	1550	

Fig. 9—Relationship of rockwell C hardness readings on threaded end to brinell readings on top of head of NE-9437 ⅝-inch N.F. bolts

Fig. 10—Tempering temperature vs. rockwell C hardness readings on end of threaded section of NE-9437 ⅝-inch N.F. bolts

TABLE I—Hardenability in Terms of Bar Size

	Hardenability Value J-45 Distance from Quenched End 1/16 of an In.			Minimum Cooling Rate °F./Sec. at 1300°F. to produce 45 R"C"			Maximum Bar Size in which tensile properties given in Figure (1) are applicable (Inches)		
	Min.	Max.	Ave.	Min.	Max.	Ave.	Min.	Max.	Ave.
NE-9437 NE-9440	6	9	7	50	30	40	⅝	1½	1 1/16
A-3140	5	10	6	60	20	40	¾	1⅝	⅞

inch on ½-inch diameter and larger as well as requirements for surface finish. In addition they may call for tensile property, hardness and microstructure tests which include austenitic grain size, decarburization limits and structural requirements.

The austenitic grain size is usually determined by the McQuaid-Ehn test. Specifications usually call for an ASTM grain size range of 1 to 4 or 5 to 8, depending on the application. Where the hardenability of the steel is low, a coarse grain (ASTM 1 to 4) may be desirable. However, in the majority of cases, a fine grain (ASTM 5 to 8) is specified in order to eliminate dangerous grain growth during heating for hardening operation. NE-9437 should always be specified fine grain (ASTM 5 to 8) as should A-3140, A-4042 and A-4140 (SAE-3140, 4042 and 4140).

The tensile properties, hardness and microstructural requirements in reality form three methods of specifying the same thing as they are all inter-related. If the hardness is low, the tensile strength will be correspondingly low and the microstructure also will reflect this condition. The tensile properties are, however, a little more revealing than a hardness test for they will show surface and internal defects as well as give values for elongation and reduction of area which are measures of ductility or the ability of the steel to be deformed in cold heading without cracking. These tests are made with the aim of predetermining the ability of the wire to be deformed in cold heading without cracking. A specification in general use calls for 110,000 pounds per square inch maximum tensile strength; 35 per cent minimum reduction of area; hardness of 96 rockwell B maximum filed flat surface; microstructure showing spheroidized or partially spheroidized cementite.

Decarburization as determined by microscopic examination is specified not to exceed 0.010-inch which includes both partial and total decarburization. Totally decarburized depth should be not more than 0.005-inch.

This test is for the purpose of ensuring a carbon content of 0.40 per cent at the pitch diameter of the threaded bolt, thereby providing maximum tensile strength at this line for a given heat treatment.

The tensile properties and hardness of the two heats of 0.616-inch round NE-9437 annealed and cold drawn wire from two sources used to obtain the data given later in the article were as shown in Table II.

There was some variation in the annealing practice of the wire from one source as the microstructure varied from partial pearlitic to fully spheroidized as illustrated in Figs. 4 and 5. On the wire from this source the decarburization varied from 0.005 to 0.015-inch from one side of the wire to the other in the same cross section. The wire from "B" source had a decarburization depth of 0.10-inch. It cannot be said the NE-9437 showed any more tendency toward decarburization than wire of standard analyses.

The austenitic grain size of both heats

TABLE II—Physical Properties of Annealed and Cold Drawn Wire (NE-9437)

Heat	Yield Point PSI	Tensile Strength PSI	Elongation % in 2"	Reduction of Area %	Hardness Rockwell B
A	83,000-95,000	103,000-105,000	24-25	58-63	93-95
B	81,000-82,000	102,000-104,000	26-28	66-67	95-98

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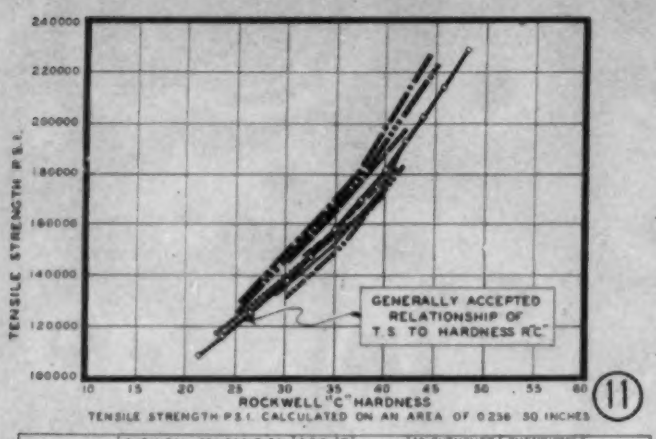
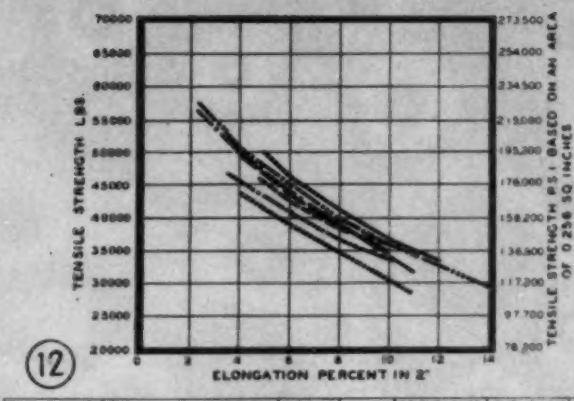

TENSILE STRENGTH P.S.I.
GENERALLY ACCEPTED RELATIONSHIP OF T.S. TO HARDNESS R"C"
ROCKWELL "C" HARDNESS
TENSILE STRENGTH P.S.I. CALCULATED ON AN AREA OF 0.256 SQ INCHES
11

STEEL	CHEMICAL COMPOSITION C	MN	S.	N.	CR	MO	VA	A.G.S. AT 1700°F	THREAD			AS QUENCHED HARDNESS R"C"	QUENCHING TEMP'S °F	MEDIUM
3135	37	67		.27	67			FINE	R	NF		50-52	1550°	
"	37	73		.20	65			FINE	R	NF		50-52	1550°	
4042	40	82	24			23		FINE	R	NF		50-55	1550°	OIL
5040	42	65	17		43			COARSE	R	NF		51-54	1550°	
NE-1340	43	58	22					FINE	C	NF		54-57	1535°	
NE-9437	42	108	52	38	35	15		FINE	C	NF		53-57	1550°	
NE-9437	41	100	43	36	39	11		FINE	C	NF		52-56	1550°	



STEEL	CHEMICAL COMPOSITION C	MN	S.	N.	CR	MO	VA	A.G.S. AT 1700°F	THREAD			AS QUENCHED HARDNESS R"C"	QUENCHING TEMP'S °F	MEDIUM
3135	37	67		1.27	67			FINE	R			50-52	1550	
3135	37	73		1.20	65			FINE	R			50-52	1550	
4042	40	82	24			23		FINE	R	N.F.		50-55	1550	OIL
5040	42	65	17		43			COARSE	R			51-54	1550	
NE-1340	43	58	22					FINE	C			54-57	1535	
NE-9437	42	108	52	38	39	15		FINE	C			53-57	1550	
NE-9437	41	100	43	36	39	11		FINE	C			52-56	1550	

Fig. 11—Tensile strength vs. hardness of end of threaded section of NE-9437 bolts is shown here

Fig. 12—Relationship of tensile strength to per cent elongation in 2 inches of NE-9437 bolts

was in the fine classification (ASTM 5 to 8) when determined at 1700 degrees Fahr. after 8 hours carburization followed by slow cooling.

The wire was cold headed into ⅝-inch hexagon head bolts, heat "A" into a 2⅝-inch length and heat "B" into 3-inch lengths. No difficulty was experienced in heading except where microstructures such as illustrated in Fig. 4 were met. These sometimes resulted in opening up of the heads.

The bolt heads were trimmed hexagonal and a one inch length National Fine (N.F.) thread was cut on the body.

Heat Treatment and Physical Properties of NE-9437 Bolts: Several thousand bolts from each heat were hardened by quenching in oil from a continuous belt type atmosphere-controlled furnace. The hardness of the bolts in the "as quenched" condition was from 52 to 57 rockwell C, the highest frequency of heat "A" was 55 rockwell C and 54 rockwell C for "B" heat. These readings were taken on the threaded end of the bolt.

The hardness taken on the top of the head ranged from 495 to 514 brinell. These readings indicated that full hardness was obtained in quenching which would ensure the maximum tensile properties after tempering.

Sample bolts were tempered from 800 to 1200 degrees Fahr. at 50 degrees Fahr. intervals. In the case of heat "A", the tempering time at heat was 1 hour, whereas, heat "B" was tempered for 2 hours at heat for each temperature.

The tensile properties of the bolts obtained at the various temperatures are shown in Figs. 3 and 6. The hardness of the bolts tempered for 2 hours at heat is slightly less than for heat "A" tempered for 1 hour at heat.

A value for the tensile strength is shown in pounds per square inch (P.S.I.) in Figs. 3 and 6 as the tensile strength of steel is usually expressed in this manner. However, there is no unanimity as to the method of determining the area of a threaded section from which this unit or psi strength can be calculated. There appear to be three methods in use obtained from the following diameters and three corresponding psi values obtainable as shown in Table III.

Note that there can be a 20,000-pound per square inch difference between the extremes of the three methods, which is a difference of more than 10 per cent. An area calculated according to the second method has been used for psi values shown in this article, for it is believed to be the one which comes the closest to approaching the unit stress values found in cylindrical tensile test bars. For example, translating 47,000 pounds into a hardness value of 38 rockwell C (Fig. 3) and applying this hardness value to Fig. 1, we have a value of 186,000 pounds per square inch.

Calculated on this basis, that is, an area obtained from the mean between the basic minor diameter and pitch diameter of the thread, the areas for various bolt sizes with N.C. (National Coarse) and N.F. (National Fine) threads are shown in Table IV.

It should not be overlooked, however, that the shape of a threaded section may distribute the load in such a way as to actually give a higher tension value than a cylindrical bar of the same diameter. The "notch" effect from the contour of the threads at their roots perhaps enters this picture.

It is common practice to specify and inspect bolts by hardness values. The data for the two heats of NE-9437 or 9440 steel are given in Figs. 7 and 8. This brings up another point which is often a source of controversy, especially when one inspection department uses the

TABLE III—Unit Stress Determinations

Diameter Measured At	Area in ⅝" N.F. Threaded Section (Inch)	Tensile Strength (PSI) for a 47,000-Pound Load
Basic minor dia.	0.243	193,400
Mean dia. between basic minor and pitch diameter	0.256	183,700
Pitch diameter	0.271	173,000

TABLE IV—Table of Areas for Calculating Pounds-Per-Square-Inch Values for Bolts

Diameter of Bolt (Inches)	Threads per Inch Coarse (NC)	Fine (NF)	Area in Square Inches Coarse (NC)	Fine (NF)
¼	20	28	0.0318	0.0364
5/16	18	24	0.0525	0.0580
⅜	16	24	0.0775	0.0878
7/16	14	20	0.1063	0.1188
½	13	20	0.1419	0.1600
9/16	12	18	0.1819	0.2030
⅝	11	18	0.2260	0.2560
¾	10	16	0.3345	0.3730
⅞	9	14	0.4618	0.5095
1	8	14	0.6057	0.6798

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brinell method to check hardness and another uses the rockwell hardness method.

Assuming that the brinell hardness reading is taken on the top of the head and the rockwell hardness on the end of the threaded section, a standard conversion chart (rockwell C to brinell) cannot be used with A-4042. The reason is that the head, which is a larger section, does not have the same hardness as the threaded section after a given heat treatment. Obviously, the two hardness readings cannot be expected to check.

Fortunately tests on NE-9437 or 9440 bolts show that a standard hardness conversion table, Fig. 9, can be used, the hardenability being sufficiently high to make this conversion practicable.

Comparison of NE-9437 Bolts with Units Made from Other Chemical Analyses: Bolts compared are ⅝-inch N.F. Assuming a hardness specification for bolts of 30 to 38 rockwell C, the NE-9437 steel bolts can be tempered to meet this requirement at 1000 to 1050 degrees Fahr. after oil hardening.

Fig. 10 is a comparison of two heats of NE-9437 with two heats of A-3135, one of A-4042, one of a special chromium steel designated as 5040 and one heat of NE-1340. The NE-1340 steel bolts have to be tempered at a lower temperature in order to fall into the same hardness range.

In Fig. 11 the relationship of the hardness to the tensile strength is shown for the various analyses. As this relationship should be the same for all steels of this general type when "fully hardened" and tempered uniformly, this chart is significant only as a means of determining that the bolts have been properly hardened and that the hardness has penetrated throughout the whole section. Should the line for any steel fall significantly below the control line, it would indicate either (1) the lack of sufficient hardenability due to a deficiency in the necessary alloying elements required to promote depth of hardening or (2) incomplete hardening in quenching, due to too short a period of heating above the critical range or (3) a delay in quenching that caused a drop in temperature below the critical range.

For information on development of NE steels and their properties, see STEEL, Feb. 9, 1942, p. 70; March 16, p. 72; June 8, p. 66; June 15, p. 66; July 13, p. 80; July 20, p. 86; Aug. 3, p. 70; Aug. 17, p. 40; Aug. 31, p. 41 and 76; Sept. 7, p. 78; Oct. 19, p. 66; Nov. 9, p. 96; Dec. 28, p. 27; Jan. 25, 1943, p. 84; Feb. 22, p. 102; March 1, p. 94; March 8, p. 90; March 22, p. 78; March 29, p. 76; April 5, p. 116 and 118; Aug. 2, p. 100.

For reports from users of NE steels, see Nov. 16, 1942, p. 106; Nov. 23, p. 90; Nov. 30, p. 62; Dec. 7, p. 112; Dec. 14, p. 99; Dec. 21, p. 70; Jan. 11, 1943, p. 60; Jan. 18, p. 66; Feb. 1, p. 100; March 8, p. 109; March 15, p. 96; March 29, p. 72; April 26, p. 84; June 7, p. 106; June 14, p. 98; June 21, p. 92; July 26, p. 88; Aug. 2, p. 94.

For latest revised listing of NE ALLOY steels, see March 1, 1943, p. 98; and p. 38, this issue.

For list of NE CARBON steels, see March 8, 1943, p. 90.

For latest revised list of AMS (Aeronautical Materials Specification) steels, see Aug. 9, 1943, p. 92. AMS nonferrous alloys are also listed there.

For details of WD (War Department) steels and complete listing, see Feb. 8, 1943, p. 80.

For STEEL's latest "Handbook on NE Steels" and the "NE Steel Selector", address Readers' Service Department, Penton Bldg., Cleveland. Price $1.00 per set.

The relationship of the elongation value to the tensile strength is not the same for all alloy compositions. This and the reduction of area values are conceded, generally, as being measures of toughness. The reduction of area value is preferred as it is independent of the gage length and in this respect differs from the elongation value which is dependent on the gage length and is also affected by the proportion of threaded section to the unthreaded body. It is, therefore, difficult to make exact comparisons between bolts having a different thread length and of a different total length. It is, however, a very important value.

An elongation value of at least 6 per cent in 2 inches is preferred in a hardness range of 30 to 38 rockwell C or a tensile range of 150,000 to 180,000 pounds per square inch, a value about half that obtained from a cylindrical test bar of the same hardness. From Fig. 12 the NE-9437 steel bolts appear to meet this requirement and compare favorably with A-3140 steel bolts as well as bolts made from the other alloy analyses.

From the data presented in Table V which shows the minimum yield point and tensile strength, values for each size and thread can be set up. These values represent approximate P.S.I. (pounds per square inch) values as follows:

Diameter of Bolt Inch	Yield Point P.S.I.	Tensile Strength P.S.I.
¼ to ⅞	135,000	150,000
⅞ to 1	125,000	140,000

The use of lower values for bolts ⅞ to 1 inch in diameter is necessary to take care of occasional heats of steel which may have a lower hardenability. A glance at Table I will show that we may have heats of minimum hardenability which will produce less than the normally expected tensile values, at least in sizes between ⅞ and 1 inch.

These minimum values listed in Table V, can be controlled by specifying a minimum rockwell C hardness value of 30 or a minimum brinell value of 277.

In order to insure that the bolts have a satisfactory degree of toughness, a minimum elongation value of 3/32-inch over the length of the bolt can be specified.

TABLE V—Table of Minimum Tensile Strength in Pounds For Alloy Bolts

Diameter of Bolt Inch	Coarse (NC) Thread Yield Point in Lbs.	Coarse (NC) Thread Tensile Strength in Lbs.	Fine (NF) Thread Yield Point in Lbs.	Fine (NF) Thread Tensile Strength in Lbs.
¼	4,290	4,770	4,920	5,460
5/16	7,800	7,880	7,840	8,700
⅜	10,500	11,600	11,850	13,200
7/16	14,350	15,900	16,000	17,800
½	19,150	21,300	21,600	24,000
9/16	24,500	27,300	27,400	30,400
⅝	30,500	33,900	34,600	38,400
¾	41,800	46,800	46,600	52,200
⅞	57,600	64,700	63,700	71,400
1	75,800	84,800	85,000	95,200

TABLE VI—Table of Maximum Tensile Strength in Pounds for Alloy Bolts

Diameter of Bolt (Inches)	Tensile Strength (Pounds) (NC) Thread	(NF) Thread
¼	5,720	6,560
5/16	9,460	10,450
⅜	13,960	15,800
7/16	19,150	21,400
½	25,500	28,800
9/16	32,750	36,500
⅝	40,700	46,100

A table can also be set up showing the maximum tensile values which will serve the same purpose as specifying an elongation value (see Table VI) as also can a maximum hardness limit, a 340 brinell or 38 rockwell C. Table VI limits the tensile strength to about 180,000 pounds per square inch maximum.

Metal Spraying, Correction

Illustrations used in connection with the article "Here's How to Keep 'em Running" in the August 16 issue should have been credited to the Metallizing Engineering Co. Inc., Long Island City, N. Y. Inadvertently, the photographs were credited to another company.

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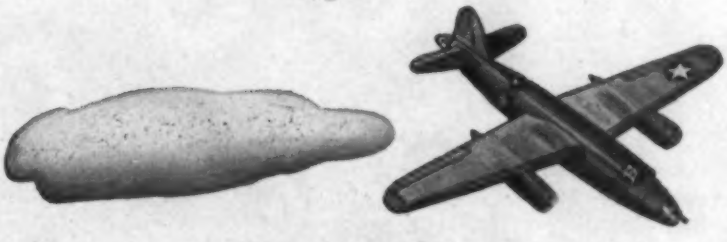

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ARMY E NAVY

INDUCTION HEAT IS I^2R

Understanding the operation of electric induction heating equipment is not difficult if you follow this simple concept which clears away much of the "mystery" that has surrounded the subject

By FRANK T. CHESNUT
Secretary
Ajax Electrothermic Corp.
Trenton, N. J.

ELECTRICAL induction heating has risen to such prominence in this war of production and so much confusing theory has been written about it that it appears desirable to make an attempt to discuss it in its simplest terms.

At the outset, one fact should be stressed; namely, that the laws governing high frequency induction heating are simple and known. Ohms law, transformer ratios, established laws of heat flow and the like do not fall down, and no alchemy is introduced, as a number of persons would seem to believe, in considering high frequency induction heating problems.

An induction furnace is a transformer. The primary of the transformer is the furnace coil. The secondary of the transformer is the charge. The ratio of the transformer is the number of primary turns to one. The effectiveness of the transformer as a furnace depends upon coupling between primary and secondary or load, the resistance of the secondary or load, and the insulation which allows the heat energy to accumulate in the secondary or load.

Alternating Current Hugs Surface

Alternating current tends to flow at the surface of a conductor rather than throughout its section, as direct current would flow. The higher the frequency of the alternating current, the more it tends to hug the surface of the conductor. The load, therefore, in the induction furnace can be assumed to be only the surface portion of whatever charge is in the primary coil; and the resistance of that load will be greater as the frequency is increased and the effective current path is reduced in section. This is substantially the only reason for high frequency; that is, by using a high frequency, the resistance loss in the charge can be increased to the point where the charge cannot carry the induced current without becoming heated.

Coupling between primary and secondary or load is important. As in any good transformer, coupling should be as close as possible; that is, the primary current path should be as near to the secondary or load current path as possible. Cylindrical coils and charges are easy to make—they fit together nicely; but there is no electrical reason why the primary windings and load cannot be (and they are) of square, triangular or of any other section so long as they are maintained in close inductive relation.

Internal heating, external heating, blade or edge heating and spot heating all require transformer theory in their operation. Even relatively thin charges such as sheets can be heated by surrounding primary coils if the frequency of the primary current is kept sufficiently high to prevent the current flowing in one side of the sheet from opposing the return current flowing in the opposite side.

A charge need not necessarily be a solid chunk of metal of round, square or other section before currents can be induced into it. It may comprise many irregular pieces of conducting material thrown together as the scrap of a melting charge. In this case, the induced current flows in the charge where the pieces are in contact, but mainly where they are in contact and near the inducing coil. The coupling then depends upon whether the points of contact between the charge pieces are near the coil or away from it.

Large pieces have few points of contact and the coupling may be poor. Small pieces have many points of contact and usually provide a good load. If the pieces are too small (powder, for instance) the contact resistance becomes objectionable.

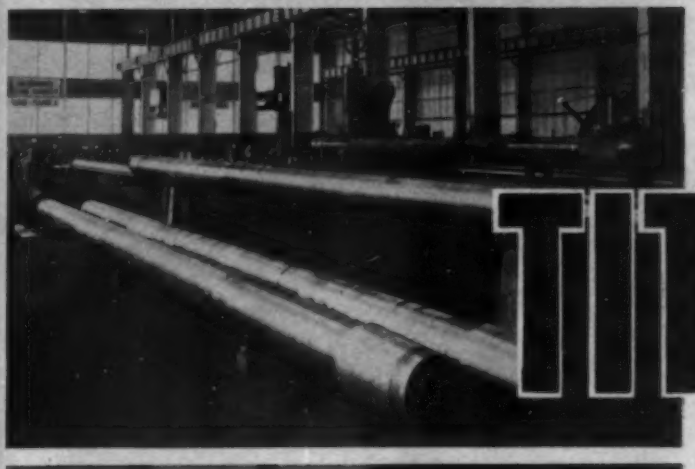
Heating is accomplished by current flow induced into a charge by transformer action—yes, plain everyday current, flowing through the resistance of the charge as in straight resistance heating. There is some heating due to eddy currents but this is of a minor nature and usually can be disregarded. Likewise, there is some hysteresis heating when the load is magnetic but this too is relatively slight and can be ignored *where the ultimate temperature to be attained is above the recalescent point*. The writer has always felt it to be a little superfluous to try to explain the heating as due to molecules in the charge trying to line themselves up with the rapidly alternating field thus causing friction and heating.

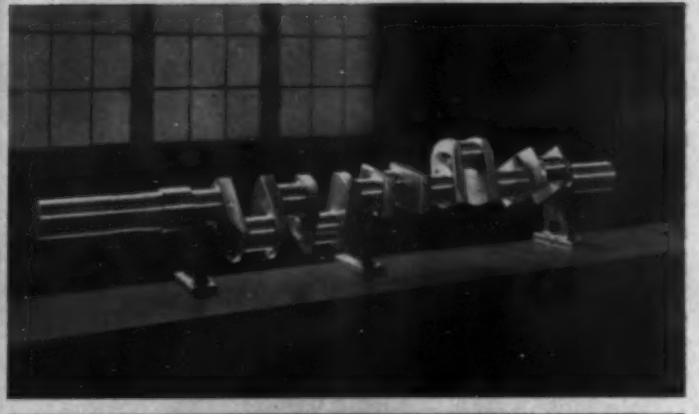
He has also felt that there is more fancy than fact in the statement that in rapid surface heating the heat is first generated in the surface and then later, as the surface loses magnetism, in the subsurface layers, progressively. Actually, as the surface loses magnetism, the magnetic field and hence the heating currents do penetrate further into the charge, *but* the principal heating is still very predominantly at the surface, and falls off logarithmically in the subsurface layers. Current penetration may vary considerably as a steel load progressively becomes nonmagnetic but even at the end of a run, the heating at the surface is very much greater than at any other part of the charge.

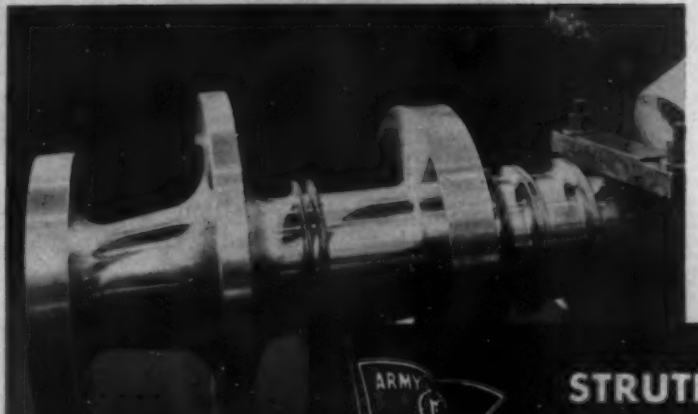
Many Factors Influence Heat

Of course, the relation between amount of heat developed from hysteresis losses, eddy current losses and plain induced current flow depend to a considerable extent on size, type and shape of the work, arrangement of inductor coils, frequency, and other factors—one of the most important of which is final temperature desired. There is no definite relation between frequency and speed of heating unless the element of power is also brought into the picture. With sufficient power, the speed of heating can be made the same over wide variations in frequency. In forging operations, the real criterion of speed of heating by electric induction is the rate at which heat flows by thermal conduction from the surface portion to the center of a charge piece. If the charge is large a lower frequency will allow the heat to be generated in the piece further from the surface. If the charge is small a higher frequency should be used to insure that the energy is absorbed before it reaches the center of the charge.

In the practical commercial range of frequencies for heating bar stock for forging 75 and 105-millimeter shell bodies, there is little to choose from so







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far as speed of heating is concerned. In heating a 3-inch diameter bar from cold to the forging temperature, for example, the average effective depth of current penetration for 1000-cycle current is about 0.3-inch. The penetration for 3000-cycle current is about 0.2-inch. Most of the energy is changed to heat near the surface proper with either frequency, but with the lower frequency the heating band is slightly deeper than for the higher frequency.

The heating time in either case must be sufficiently long to allow the heat to be conducted to the core so that, considering the lapse of time between the time the power is turned off and the piece is forged, the center and surface portions of the bar will be at substantially the same temperature. No matter which frequency is used, the time to bring the piece to a uniform forging temperature will be about the same.

The actual heating time can vary, depending on how the piece as a whole is brought up to temperature. The power may be very large at the start, bringing the surface to the maximum temperature quickly; then the power may be dropped sharply to the point where the outside temperature will not overshoot while the center portion comes to temperature. This method heats the piece in the shortest possible time but is usually wasteful of equipment and hard to control. The method preferred by the writer is to use a comparatively simple power time cycle in which power averages a constant figure over the duration of the run and the center and outside portions of the bar come up together. Less power and far less control equipment is required.

In an actual installation which I believe is well designed, 100 kilowatts are used to heat a 19-inch length of a 3-inch diameter steel bar to 2200 degrees Fahr. for forging a 105-millimeter shell. The heating cycle is 4 minutes, the frequency 1000 cycles. At the end of 4 minutes, the bar is of uniform temperature. Of course, five or six bars are being heated simultaneously so that the production rate is but a fifth or sixth of the unit heating time.

A 2¾-inch diameter bar is heated for 2 minutes and 20 seconds for forging a 75-millimeter shell. For a 1-inch diameter piece, 1 minute; and for a 7-inch square billet, 15 minutes, respectively, have been found sufficiently long to obtain unformity of center and surface temperatures.

Where thin surface hardening is required, an ultra high frequency with high power may save equipment cost. In some instances, only a very thin surface layer need be hardened and if frequency and power are sufficiently high to limit heating to that area, a real saving can be effected. A frequency of 500 kilocycles generated from a tube converter may have real merit.

For the deeper hardening now being practiced, where the charge diameters are over 2 inches, for instance, any frequency above 1000 cycles can be effective. For smaller diameters frequencies of 2000, 3000 and 10,000 cycles and up are necessary to be certain that the heating will be effectively limited to the surface areas. *With a given amount of power, the heating can be more effectively limited to the surface by using higher frequencies.*

The selling price of high frequency equipment varies widely depending upon the application, the type of generating equipment and the control desired. Table I can be considered approximately in line with present day costs. The figures are for the electrical equipment complete but not installed. The price in each case includes at least one spare furnace.

TABLE I—Cost Data on Induction Heating Equipment

Type of Equipment	Range in Power	Cost per Kilowatt
Motor-Generator	50-1200 Kilowatt	$180.- 70
Spark gap converter	3- 40	230.-150
Vacuum tube converter	5- 100	475.-275

Induction heating is here to stay and as rapidly as peacetime effort replaces war-time effort, the high frequency heating equipment installed for making guns, bombs, tank and aircraft parts will be turned to the automotive and peacetime trades. Induction heating equipment is not expendible.

X-Ray Unit Inspects Casting in 5 Seconds

Metal castings can be X-rayed for defects at a rate of one every 5 seconds by means of a new mass production X-ray machine developed for a Midwestern war plant, Westinghouse engineers disclosed recently. The unit is capable of inspecting as many as 17,000 airplane castings in a 24-hour day. Key to the new unit's speed is a moving conveyor, 40 feet long and 3 feet wide, that transports the castings through the X-ray inspection and provides the fastest method yet devised to spot flaws in large quantities of metal parts.

The machine produces an exposed film of six castings every 30 seconds to provide an almost continuous flow of exposed film ready for developing. When developed, each film shows an inside view of the six castings. The actual X-ray inspection is conducted inside two steel towers, each 12 feet high and situated near the middle of the conveyor. Each tower houses an X-ray tube—one tube operating at 140,000 volts, the other at 220,000 volts—so castings of different types and thicknesses can be examined at the same time.

The castings move along the conveyor on trays that halt automatically under the X-ray tubes. A lead-lined protective device shields workmen from X-radiation while the exposure is made, and the castings then continue along the conveyor. Owing to the safety factor provided by the lead-lined hoods, the unit can be operated anywhere in the plant and other work can continue without interruption while the X-ray exposures are being made. The unit can be operated by one or eight men, depending upon the volume and speed of production desired.

New Metal to Metal Bond Stronger Than Riveting

Bonding metal to metal, rubber, synthetic rubber, plastics, leather or wood, or any combination of these, with a bond in most instances stronger than the materials themselves, is now possible by using a new method known as the Reanite bonding process, developed recently by U. S. Stoneware Co., Akron, O. In fact, repeated tests of the bond proved itself to be stronger than riveted or spot welded joints, according to the company. A normal bond between metals ranges from 1000 pounds per square inch to as high as 3000 pounds per square inch. The bond developed between rubber and metal ranges from 900 pounds to as high as 2000 pounds per square inch.

Application of the process is simple. Surfaces to be bonded are brushed, sprayed or dipped with Reanite. After drying, mild heat and pressure is applied. While the bond develops its maximum strength at room temperatures, its strength over a temperature range of from —40 degrees Fahr. to as high as 300 degrees Fahr. is substantially stronger than many other bonds. The joint is unaffected by fresh or salt water, is noncorrosive to metals, possesses excellent corrosion-resistance in itself, and high dielectric strength, the company states. The process is said to be suitable for use with almost all metals—iron, steel, stainless steel, magnesium, aluminum, aluminum alloys, copper, bronze and brass.

FOR WAR TODAY—FOR YOUR PRODUCTS TOMORROW

DIE CAST CLAMPS FOR PLANE REFUELERS

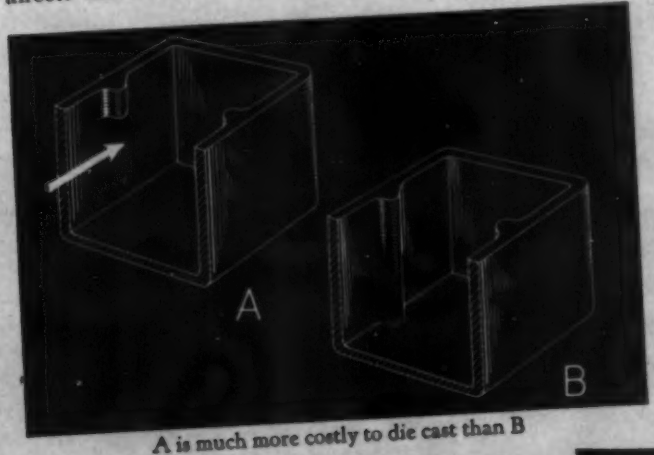
For the protection of volatile fuels

Unusual care is taken by our Air Forces to insure the safe handling of aviation gasoline—with minimum loss through evaporation. In this connection, note the sealing mechanism for the manhole covers on tank trucks (above) for refueling war planes.

The manhole cover is shown in both the opened and closed positions to reveal the tight sealing function of the four clamps. Each of these clamps consists of the three zinc alloy die castings in the foreground, plus a spring and a metal hook. Performance records have shown that these zinc alloy die castings possess the necessary physical requirements, and low cost is an additional result of the adoption of this metal and method of production.

SPEED-UP PRODUCTION THRU CAREFUL DESIGN

Since high production rates are a major advantage of zinc alloy die castings, any design feature which adversely affects these rates should be avoided when possible.



A is much more costly to die cast than B

THE New Jersey zinc ALLOY POT

A publication issued for many years by The New Jersey Zinc Company to report on trends and accomplishments in the field of die castings. Title Reg. U. S. Pat. Off.

STEEL MAGAZINE EDITION **No. 13**

For example, the drawing below (left) shows how a typical undercut (A) can be eliminated by simply extending the boss to the bottom of the casting (B). This change does not affect the utility of the part, and it greatly reduces the cost of production by simplifying the die and increasing the casting rate.

For other design hints you should have our booklet "Designing for Die Casting." A copy is yours for the asking.

A TIME BOMB CAGE IS DIE CAST IN ZINC ALLOY

The zinc alloy die casting shown below is a cage which supports a timing mechanism and a dynamite charge for exploding nitro-glycerine in oil wells. A rather complex casting, isn't it?

As with the manhole clamp unit also shown on this page, zinc alloy die castings have been adopted to replace another material. It is one of the principal endorsements of zinc alloy die castings that few first-time users ever revert to former materials and methods of manufacture.

In this particular instance, an unusual shape is produced in one piece with practically no machining, and dimensional accuracy is achieved for the close fit of the time release mechanism. Low cost and good physicals are a tough combination to beat.

A handful of complexity

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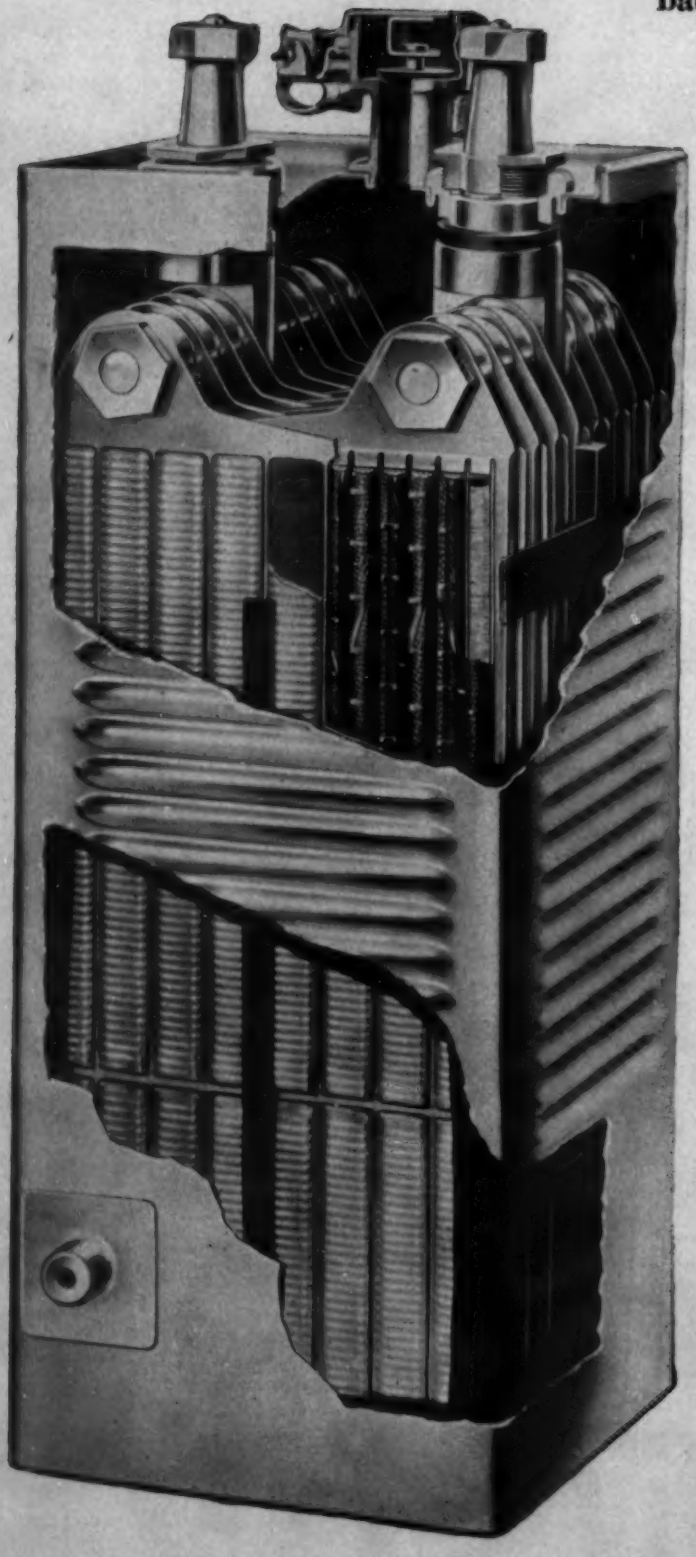


This Edison cell is built of steel throughout. Its alkaline electrolyte is a preservative of steel. Its most distinctive performance characteristic is its great dependability.

Batteries of these cells are used in industrial trucks, in railway cars, in mine locomotives and, in general, wherever insurance against sudden and unexpected failure is necessary.

This insurance is doubly important today because delays in essential war production cannot be tolerated. The durability of these batteries also makes them long-lived and therefore economical to operate.

The Edison Alkaline Battery cell, as pictured here, is precisely and ruggedly fabricated. In the days of slogans it was tagged: "Built like a watch—rugged as a battleship."

Millions of these cells are now in use. If you want the story of this ingenious invention of Mr. Edison's, send for Booklet EAB 16. Address Edison Storage Battery Division of Thomas A. Edison, Inc., West Orange, N. J.

Edison

ALKALINE BATTERIES

What you should know about Principles of Materials Handling

By ASA S. KNOWLES

TRANSPORTATION TECHNIQUES

PRINCIPLES underlying the techniques of material handling may be organized under these headings:

—Routes for material handling conveyances
—Methods of moving materials
—Ways to apply motive force
—Continuous vs. reciprocating movement of conveyances
—Piling, loading, and unloading.

Routes for Conveyances—Floor Roadways: Any type of material can be moved in containers along open roadways and ramps. The floor roadways of industrial plants are very flexible for routing materials in process. Aisles of sufficient width must be provided, however, for two-way traffic of different types of trucks and vehicles as well as for foot passage. To be most useful aisles must be kept smooth and hard because they receive much abuse from heavy traffic.

Floor Tracks: Tracks facilitate the control of a train of conveyances and reduce rolling friction to a minimum. Moreover, they are easier to maintain than wide roadways. The use of tracks, however, injects inflexibility into material handling because material can be moved only to locations provided with tracks. Except as adequate switches are provided, tie-ups may result. In addition tracks make the passage of other vehicles more difficult. These same principles apply to the use of other types of conveyances such as pipe lines and canals at the floor level.

Overhead Routes: Overhead routes are particularly useful in piling, loading, unloading, scooping, and dipping which are so often an essential part of the manufacturing process.

If materials can be transported on overhead routes economies in floor areas can be effected. It must be recognized, however, that overhead transportation results in more expensive installation. Maintenance costs are apt to be higher because of the difficulties of accessibility of the defects as well as dangers from a safety standpoint. Most accidents in the use of material handling equipment occur not because of flaws in equipment but because of careless attachment and movement of loads.

Methods of Moving Materials: The actual movement of materials is a result of either sliding the material to be moved or else using wheels in conjunction with the vehicle itself or some type of conveyance.

Sliding: Materials may be moved by sliding them over solid surfaces. An elevator is guided by sliding contact with vertical shafts, and material slides down certain types of gravity conveyors. Materials that float may be moved by placing them in a fluid in order to slide them along. Less motive power is required to move materials when the friction between the moving object and fixed surface is at a minimum, but when friction is at a minimum, it becomes more difficult to control or stop movement.

Wheels: Since rolling friction is usually less than sliding friction, power requirements are reduced by placing wheels between objects and the fixed surface over which materials to be moved must travel. The early pioneers in mechanical handling of materials gave considerable attention to the problems of using wheels. The various types of solution have naturally varied. The best place to attach wheels varies with the problems under consideration. Several possibilities follow:

—Attach the wheels to the conveyance itself. This is done in the case of the tank truck to which wheels are attached. The wheels are affixed to the tank rather than placing the tank on other types of conveyances.

—Place the materials on a conveyor with wheels already attached. This is done when materials are placed on trucks and trailers.

—Place free rollers between the objects and the surfaces over which they are to be moved. Rollers facilitate movement and are generally used to move larger objects over considerable distance.

—Attach rollers to surfaces over which materials are to be moved. When this is done a roller conveyor results.

—Place materials on a secondary surface moved by rollers. A conveyor belt provides a surface which may be moved by rollers at either end.

Application of Motive Force: Motive power for the movement of materials may be provided in one of two ways: It may be generated on the conveyance itself, or outside the object to be moved.

When mechanical power is generated on a conveyor, energy in some form is supplied to the conveyance in order that mechanical power can be produced. In the case of gas and steam engines, fuel (oil or coal) is periodically supplied the conveyance and becomes a source of mechanical energy. Similarly batteries become a source of energy for electric motors used to propel vehicles.

When power is generated from an outside source and is applied to materials, the latter move as a result of the application of the power. Examples follow:

—Rollers may be rotated. This is the principle on which the roller conveyor operates. An object is rested on rollers whose axes are fixed and the rollers are free to turn but not to travel. Rotation of the rollers moves the object.

—Differences of pressure may be created when the pressure of one part of an object is greater than that of another. The object will then tend to move away from the point of greatest pressure. Rods or hammers may be extended from stationary points to push something or a push may be supplied by another conveyor.

—Conveyors may be pulled. A tractor, trailers, or trucks may be moved by another vehicle with a connection of fixed length or by means of pulling a rope to reach a second fixed point.

—The downward pull of gravity may be used. It is generally easy to use gravity when moving objects downward but there is danger that this movement will be difficult to control.

The motive force used to move material may be applied as a steady, constant push, pull, or twist; or intermittently as a series of shocks. More energy is imparted to the material if the propelling force has motion before its application to the material, i.e., the energy

From *"Supervision"*.

transfer to the material is greater under the condition of impact due to the addition of momentum, or kinetic energy as part of the motive force. The practical application of this principle is limited to materials which will not be damaged by the shock of the impact.

Physical movement of materials may be controlled both as to direction and speed. The control of direction is accomplished by applying: A motive force that moves the object in a desired direction. A path which the material must travel if it moves at all. (Tracks keep cars in line and keep elevators from swaying.)

Speed is controlled by reversing and reducing the motive power which initiates movement. It is controlled also by increasing rolling or sliding friction and providing barriers in the paths of material movement.

Cutler-Hammer Poster Aids Magnet Crane Men

Thirteen suggestions on how to make magnets lift more, work faster and last longer are incorporated on an 8 x 20-inch display card being offered free by Cutler-Hammer Inc., Milwaukee, to users of magnet cranes. Suggestions are in simple language backed up by graphic pictures informing the operator just what, and what not to do.

Hydraulic Institute Revises Its Test Code Section

Complete revision of the test code section of its standards was announced recently by the Hydraulic Institute, New York.

The section, first published in 1936, contains specific recommendations for testing centrifugal and rotary pumps, both for acceptance tests in the field, and in the plant of the pump manufacturer. It contains the limiting conditions for all methods of quantitative determination of capacity, head and power input, whereby the accuracy for an acceptance test can be obtained.

Copies of the code are being offered at the institute headquarters at 90 West street, at 50 cents per copy.

Westinghouse Display Boards Aid Tool Conservation

To help conserve tools and to obtain maximum production from tools now in use, it is necessary that they be sharpened properly.

At Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., several especially prepared display boards showing proper cutting angles for various metals in use are being utilized as a guide in order that a quick checkup can be made by any drill-press operator. Prepared by the headquarters manufacturing engineering department of the company, the boards are placed near tool cribs and cutter grinders to serve as a constant reminder to workmen that proper tools are essential to quality production.

Baldwin-Southwark Makes Wood Toughness Tester

A new machine for testing the toughness of wood, developed recently by U. S. Forest Products Laboratory, is now being manufactured by Baldwin-Southwark Division, Baldwin Locomotive Works, Philadelphia. The machine, it is reported, discloses possible physical weakness in wood more accurately than by density and other physical property tests.

Compression defects which might not be discovered by usual inspection methods are revealed. The machine operates by a falling pendulum which breaks a wood specimen supported as a simple beam loaded in the middle. It has 15 different loading capacities and three speeds to rupture the specimen of wood being tested.

Electric Arc Welding Discussed in Portuguese

Covering the theory and practice of electric arc welding, *Em Torno Da Soldagem Eletrica* is the first book of its kind to appear in Portuguese language. Written by Victor E. de Strasser and published by Conferencias Realizadas Na Federacao Das Industrias Do Estado De Sao Paulo, Rio de Janeiro, it gathers sporadic articles in a short and concise form, which demonstrates the advancement of arc welding in this age of iron and steel.

Applications in structural buildings, making of armaments, Liberty ships, railroad works, and many general machine applications are described and illustrated. A short description is embodied of the electric arc itself, different types of electrodes, welding machines, and welding transformers.

The book discusses in detail the determination of quality of welds, safety in arc welding, mechanical and X-ray tests and gives valuable data on the malleability of welds. Alloyed steel welding as well as cast iron welding—employing well-known American techniques—are explained and illustrated. In its last chapters the book gives clear, concise welding instructions.

As a whole the book points out the unrestrained progress made by electric arc welding in general and particularly in Brazil. While on one hand many new and original ideas are mentioned, reference is made to numerous American and English sources, especially STEEL magazine.

—Dr. J. A. Neumann

Function of Plane Parts Checked Before Assembly

Special equipment and fixtures at the Missouri plant of the Airplane Division of Curtiss-Wright Corp., for testing the proper functioning of warplane accessories before they are installed in military aircraft are saving hundreds of hours and cutting several hours off individual special jobs. Formerly accessories were tested after they were installed in the warplanes. No longer are skilled mechanics and technicians required for checking engine and electrical units as well as a large amount of plane engine controls, for now all accessories are checked first before installation.

Under the "pre-set" system, as it is called, aircraft accessories are set to the correct limits before becoming a part of the military plane. In addition, operators entirely unfamiliar with this type of equipment may be trained to test parts on the new fixtures in a limited time.

A typical fixture consists of a cabinet and appropriate panels fitted with the necessary equipment, gages, or electrical instruments to perform a fixed check on one unit, or related units. It functions automatically, so far as possible, and is arranged so units to be tested cannot be connected improperly.

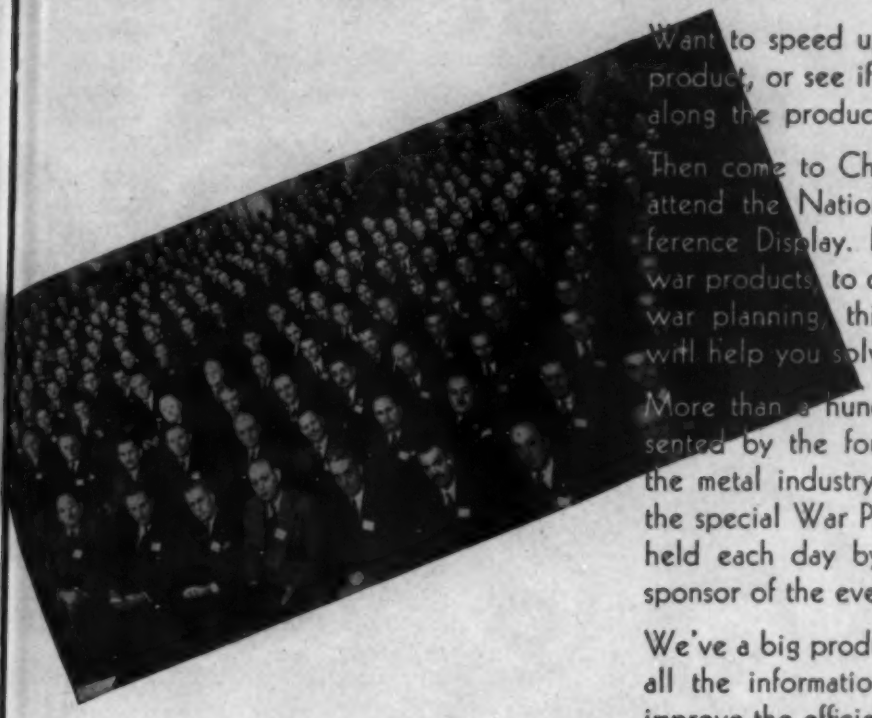
Accessories are held on the fixtures in a position where they may be checked quickly and adjusted under operating loads without marring any part. Whether the unit is pre-set, or only checked, defectives are caught immediately.

In the Missouri plant it is a practice to pre-set fuel pumps, generator relays, voltage regulators, propeller governors as well as fuel, oil and vacuum-pressure warning units, booster coils and fuel-level gages.

The plant also checks the proper operation of starter and battery solenoids, hydraulic pumps, vacuum pumps, generators, fuel analyzers and indicators, flap and landing gear position, transmitters and indicators, radio assemblies, fluorescent lights and inverters, and outside air and carburetor inlet air temperature bulbs and indicators.

An example of the time saved by this method is in pre-setting the generator voltage regulator for a warplane. One hour per plane was required to perform this function under engine power. Now a regular unit is checked and set in 20 minutes without any engine run or further adjustment after installation.

Looking for Information?



Need a little help on that metal problem of yours?

Want to speed up production of some particular war product, or see if you can save some metal somewhere along the production front?

Then come to Chicago the week of October 18 and attend the National Metal Congress and War Conference Display. Devoted to increased production of war products, to conservation of materials, and to post-war planning, this great event of the metal industry will help you solve many problems.

More than a hundred technical lectures will be presented by the four cooperating societies. Leaders in the metal industry and government will participate in the special War Production and Conservation Sessions held each day by the American Society for Metals, sponsor of the event.

We've a big production job still ahead of us. We need all the information and new developments that will improve the efficiency of armament production. So mark your calendar now — and plan to be in Chicago when the metal industry meets the week of October 18.

THE PALMER HOUSE
Chicago - October 18 thru 22

NATIONAL METAL CONGRESS
and
WAR CONFERENCE DISPLAY

● **Thousands of visitors to the Metal Congress will look to the hundreds of War Conference Displays for new products, new processes, and new developments. 65% of the available display space has been reserved in the first four weeks following announcement of this 25th Annual Conference Display.**

But excellent display room locations are still available. For complete information, write or wire the American Society for Metals, 7301 Euclid Avenue, Cleveland 3, Ohio. Phone: ENdicott 1910.

NATIONAL METAL CONGRESS AND WAR CONFERENCE DISPLAY
Under the direction of the American Society for Metals, in cooperation with the American Welding Society, the Wire Association, and the Institute of Metals and Iron and Steel divisions of the American Institute of Mining and Metallurgical Engineers.

FORGING SHELL At Ambridge

. . . . reveals improved practices. Billets are flame cut into doubles, flame nicked and broken into singles. Pierce-and-draw method assures necessary concentricity. "Muffs" on cooling conveyor control cooling action. Die steel in draw rings conserved by employing rings on successively larger shell as wear increases their size

(Section II in Series on Advanced Forging Techniques.)

By ARTHUR F. MACCONOCHIE
Head, Department of Mechanical Engineering
University of Virginia
University Station, Va.
And
Contributing Editor, STEEL

AMIDST OMINOUS warnings of faltering arms production throughout the country at large in recent months, it is comforting to note that in at least one plant, the Ambridge (Pa.) unit of National Supply Co., Spang-Chalfant Division, recent monthly production of high-explosive shell forgings is some 15,000 per unit in excess of the average monthly output since the plant commenced operations March 12, 1941.

As a little bit of added discomfort to the Axis, this one plant has manufactured, in the past 28 months, a sufficient number of projectiles to present at least two (fuze end foremost) to each German soldier on the Eastern Front. Did we but have a 100 per cent effective delivery system, the war would be in its last stages, but unfortunately both the tonnage of metal required to put one soldier out of action and the cost of that operation mount steeply from one war to the next.

There are five forging units in the Ambridge plant, all alike. Each unit can produce forgings ranging in size from 75 millimeters to 5-inch AA. Units can be changed from one size to another in less than eight hours. Steel for the forgings is delivered in the form of square billets with round corners, conforming to AISI specifications for sections and WDSS3 and Navy specifications for analysis. Billets for the 75-millimeter size are 3 inches across the flats; 4 inches for 105-millimeters; and 4½ inches for 5-inch AA.

The method of billet separation employed takes advantage of the speed of breaking and the accuracy of flame cutting, inasmuch as the billets are first cut into doubles with the torch and then flame nicked and broken into singles. When flame cutting is used alone, there is no opportunity of examining the billet for internal defects, for in the cutting,

The invaluable assistance of W. M. Frame, works manager of National Supply Co.'s Spang-Chalfant Division, is gratefully acknowledged by the author. All photos were taken specially for STEEL by the plant photographer.

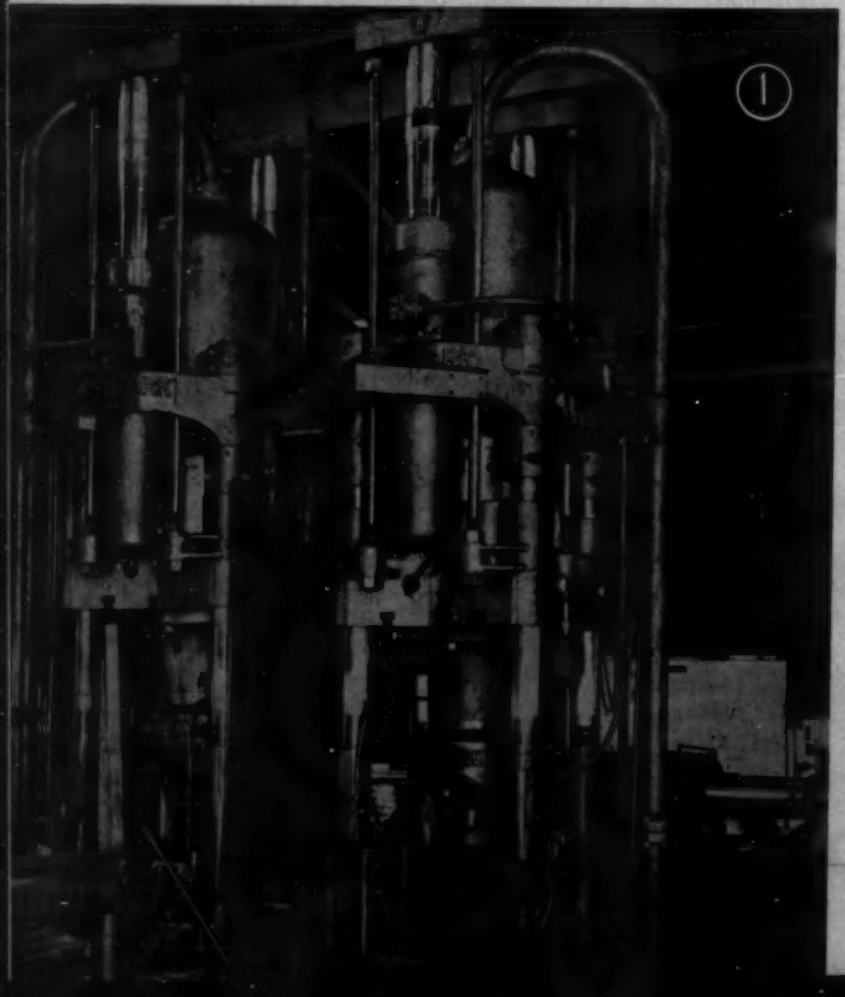


Fig. 1—General arrangement of forging unit. Each unit comprises two 320-ton vertical presses and a 75-ton horizontal draw bench seen in rear at right. Vertical presses alternate, one billet going to one press, the next billet going to the other

Fig. 2—Double billets are "nicked" by cutting a groove into one face as shown here. This permits easy breaking into singles

the flame destroys the visible structure, melting and sealing over the metal on the surface of the cut end. If broken, slivers and rough breaks may mask holes and cracks in the broken bar, too. If breaking is resorted to entirely, irregular breaks on both ends might, by the laws of chance, produce an underweight slug once in a while. Thus the combination of cutting and breaking is advantageous. Breaking is best done while the steel is cold, let us say under 40 degrees.

Stops Govern the Cut

The equipment used for flame cutting into doubles is shown in Fig. 3. Two torches are carried on one carriage. The torches are held stationary at first in order to pre-heat the work. Then the traversing mechanism is started and the oxygen turned on. Both cuts, as may be observed, are taken simultaneously, the length of the cut being determined by stops not clearly seen in the illustration. Billets are placed some little distance apart on the table in order that crooked or twisted specimens may not interfere with one another. One man and one helper operate one burning table.

The next step in the sequence of operations is flame nicking, Fig. 2, a necessary prelude to breaking. The torch is held momentarily on the corner for pre-heating, then the oxygen is turned on, while the acetylene continues to burn, the nick begun at the corner is extended clear across the face. Nicking, being a much faster operation than burning all the way through, enables one nicking table to take care of two burning tables. One man and a helper operate each nicking table.

After burning and nicking the billets are cooled by water spray and then broken on the power hammer shown in Fig. 4. A press is also used for break-

Fig. 3—Machine for flame cutting billets into doubles. Note cooling water jet following the two torches. Cutting head does not travel lengthwise, only across row of billets, which are advanced under head for each successive cut

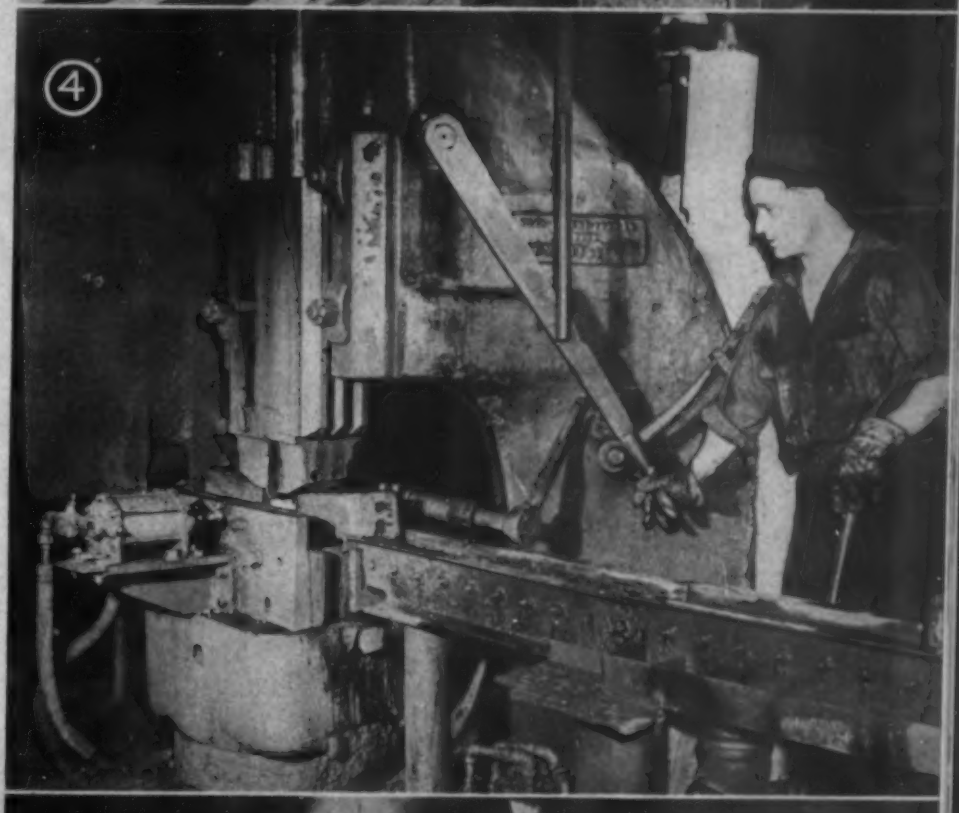


Fig. 4—Billets travel down conveyor from the extreme right and position themselves against a stop under the hammer which then is actuated to break the double billet length into two sections, each of which will subsequently become a shell forging

Fig. 5—Billets are heated in rotary hearth furnaces, being charged into door seen partially at extreme left. After traveling around furnace to discharge door, they are removed and dropped onto roller conveyor at right which carries them to scale breaker

Fig. 6—Here forging is being pushed to the right through rings of draw bench after being pierced. When it reaches discharge platform in center, operator will remove and place it in "muff" shown in Fig. 7

ing the billets. One man and a helper operate the hammer and pile the billets in boxes for government inspection of the fractured ends.

This inspection is of the utmost importance, for should pipe run in the heart of the billet and remain undetected, a porous shell base might result. It is true that all bases of high-explosive shell are protected by a disk of rolled plate, welded on. But these disks *have* been known to get knocked off. Then there would be no protection against penetration of high pressure and high temperature gases into the explosive charge filling the shell cavity with resultant bursting of the gun on firing.

Production rates on the burning table run from 1100 per 8-hour turn in the case of 75 millimeters to 700 for 105 millimeters. Output drops to 650 in the case of 5-inch anti-aircraft shell, the largest size forged.

Next in the production line is the important job of heating. National Supply employs gas-fired rotary-hearth furnaces of the type shown in Fig. 5. The furnace is maintained at a temperature of around 2350 degrees Fahr. The hot billet, after removal from the furnace in Fig. 1, is being dropped upon the roller conveyor which carries it to the scale breaker. Each of these rotary furnaces has a capacity of 360 billets for 75-millimeter or 240 billets for 105-millimeter shell based on a 1-hour cycle; billets for 5-inch projectiles require 75 minutes and furnace output is 192 per hour.

Two types of scale breakers are used. Both employ a sizing opening through which the billet is pushed by a hydraulic ram. In one case the opening consists of a two-high roll stand with a box pass, while in the other it is merely a hole in a double plate. After passage through

Fig. 7—From draw bench, forging is placed on short roller conveyor section here and pushed into lower opening in "muff" which is hung on chain conveyor and insulated to control cooling. Similar roller conveyor section at extreme left at higher level is used to load upper openings in muffs. After cooling to black heat, forgings are removed from muffs, hung on hooks as seen below muffs here, where they cool further

Fig. 8—Finished forgings are placed in dump box of industrial truck and carried into freight car for shipment. Box can be tilted to dump load as shown. Once in car, forgings are carefully stacked and separated into groups by firmly anchored bulkheads to prevent shifting. Note woman operator

TABLE I—Analysis and Service Life of Tools

	Carbon	Chromium	Moly.	Tungsten	Silicon	Van.	Nickel	75-mm.	105-mm.	5-inch AA
Piercing tips	.30	5.00	1.50	1.00	1.00		...	700	370	320
Draw bench tips	.35	1.50	1.00	...	...	0.20	...	1,600	1,980	1,050
Draw rings	1.50	12.00	...	...	...	...	...	25,000	20,000	15,000
Piercing Pot (Iron Alloy)	3.50	1.25	...	...	1.80	...	0.60	6,000	5,100	3,500

Park

90 Casing Salt GIVES YOUR TOOLS LONGER LIFE

★ This photograph shows one of Park's metallurgists running a test with Park's 90 CASING SALT by putting a nitride "case" on a high-speed milling cutter after it has been completely ground to size. This test is made in Park's modern laboratories to predetermine for their customers the value of this operation in their heat-treat departments. It is found that this "case" is extremely hard and reduces frictional resistance. This is particularly advantageous when non-ferrous metals are being machined.

Many companies today are saving time and money and also conserving on critical tool steel by prolonging the life of their high-speed tools in using Park's 90 CASING SALT. If you are interested in prolonging the life of your tools, write us today for complete information about Park's 90 CASING SALT—another one of Park's Laboratory Controlled Products.

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8080 MILITARY AVE. DETROIT, MICH.

Dr. M. D. Stone is chairman of the American Society of Mechanical Engineers' Special Research Committee on Forging of Steel Shells. Work of this committee is being backed by the United States Army Ordnance Department as was explained in STEEL, July 26, p. 78.

Dr. Stone was born in 1902, graduated from Harvard Engineering School of Mechanical Engineering in 1923, subsequently received advanced engineering degrees for work at Harvard, University of Pittsburgh and abroad; from 1925 to 1934 was at Westinghouse Electric & Mfg. Co. in research, power and general engineering departments in various supervisory capacities—also head of Mechanical Design School—liaison engineer in European countries for a year; from 1934 to present at United Engineering & Foundry Co., developing steel mill equipment and processes; now is manager, development department.

the sizing opening, the cracked scale is immediately hit by jets of high pressure water which blast off scale.

The actual forging is now carried out in the equipment shown in Fig. 1. Each unit consists of a pair of 320-ton vertical presses set side by side, and a 75-ton draw bench in evidence in the background. The presses are used alternately; that is, a billet goes to one press, then to the draw bench; the next billet goes to other press, then draw, etc.

Fig. 9 shows the tool setup on the piercing press. In the left hand view the press is open and the square billet with its rounded corners as shown by the dotted outline sits in position on the chair. This chair is mounted on the upper part of a piston which floats on the accumulator system. The punch itself is stationary. As the die pot moves downward in the forging operation, the hot billet is first rammed into the pot with a force of about 60 tons, exerted through the chair. The pot now is seated around

(*Please turn to Page* 95)

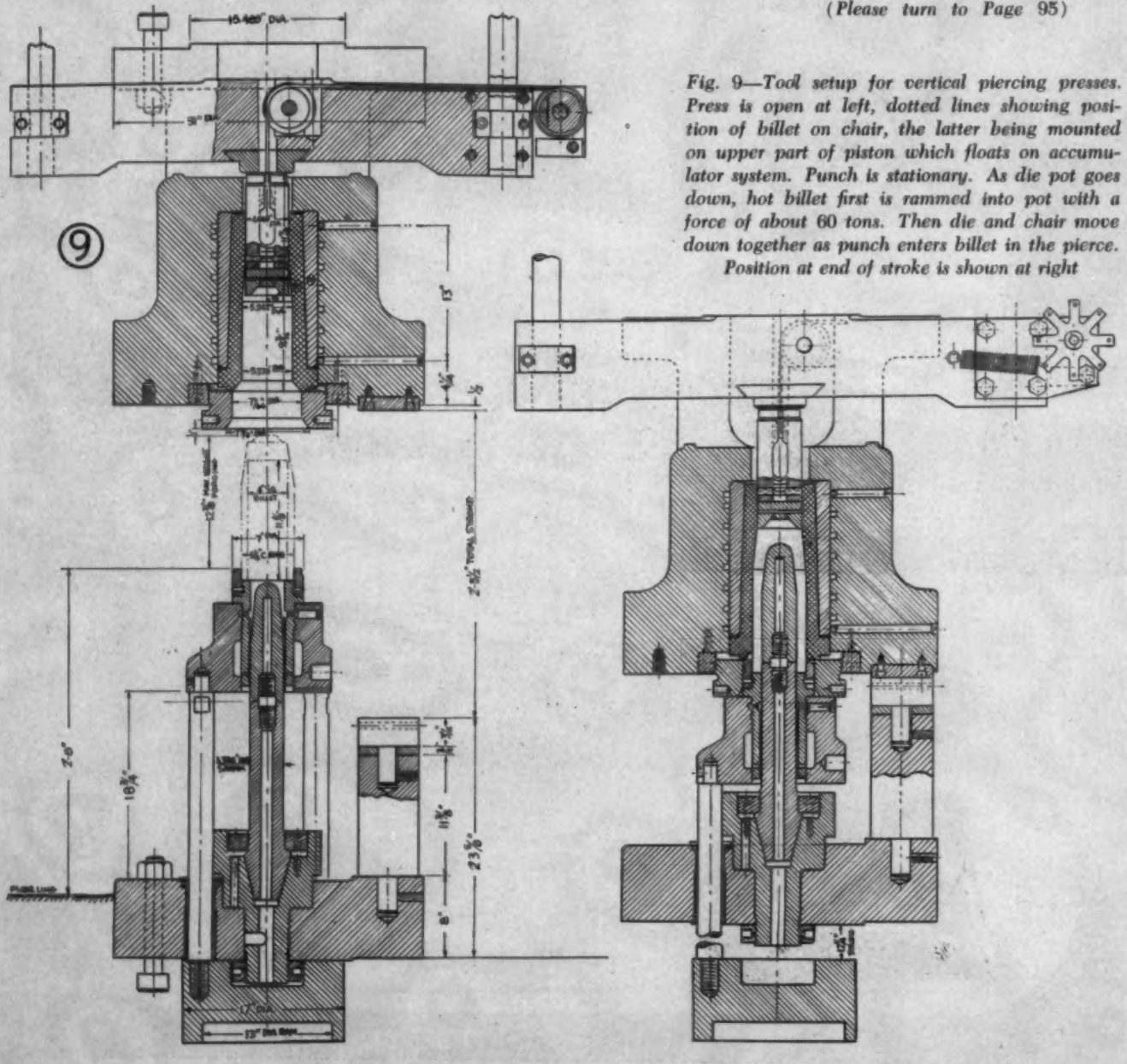
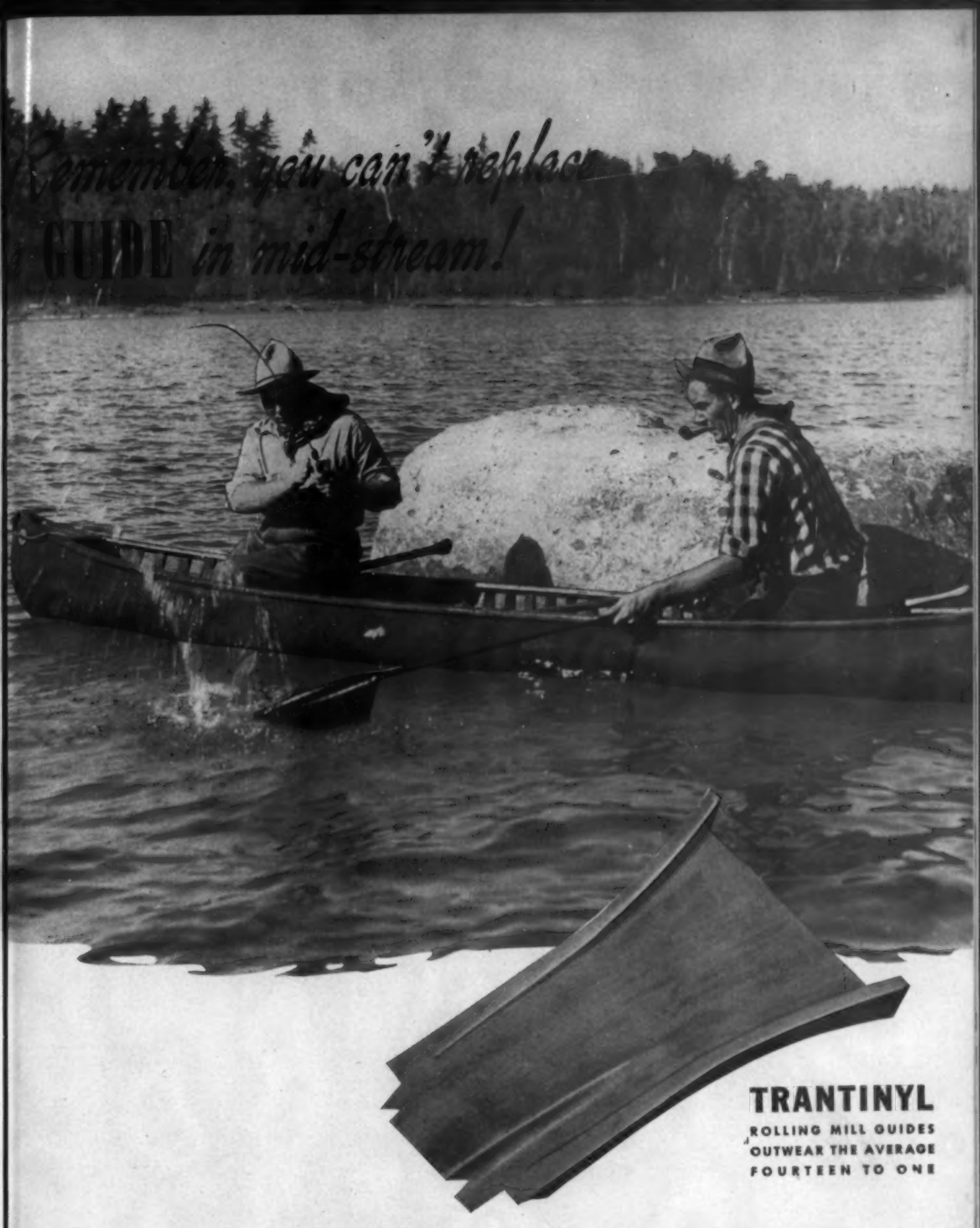


Fig. 9—Tool setup for vertical piercing presses. Press is open at left, dotted lines showing position of billet on chair, the latter being mounted on upper part of piston which floats on accumulator system. Punch is stationary. As die pot goes down, hot billet first is rammed into pot with a force of about 60 tons. Then die and chair move down together as punch enters billet in the pierce. Position at end of stroke is shown at right



TRANTINYL

ROLLING MILL GUIDES
OUTWEAR THE AVERAGE
FOURTEEN TO ONE

Youngstown Alloy Casting Corporation

YOUNGSTOWN, OHIO

PRODUCTION OF LOW-PHOS CHARGING STOCK

By Direct Reduction

Synthetic scrap produced by the Harman process serves as a high-purity charging material for acid open-hearth and electric furnace practice. Because of the absence of excess carbon iron is reduced without reducing the silica in the ore

THE STEEL industry, working to exacting specifications in the production of steel is confronted with a problem caused by the ever-increasing contamination of scrap with alloys. This is especially true for steels produced in acid open hearths, electric induction furnaces and electric arc furnaces where little or no refining is done and where practice consists essentially of making additions to meet specifications.

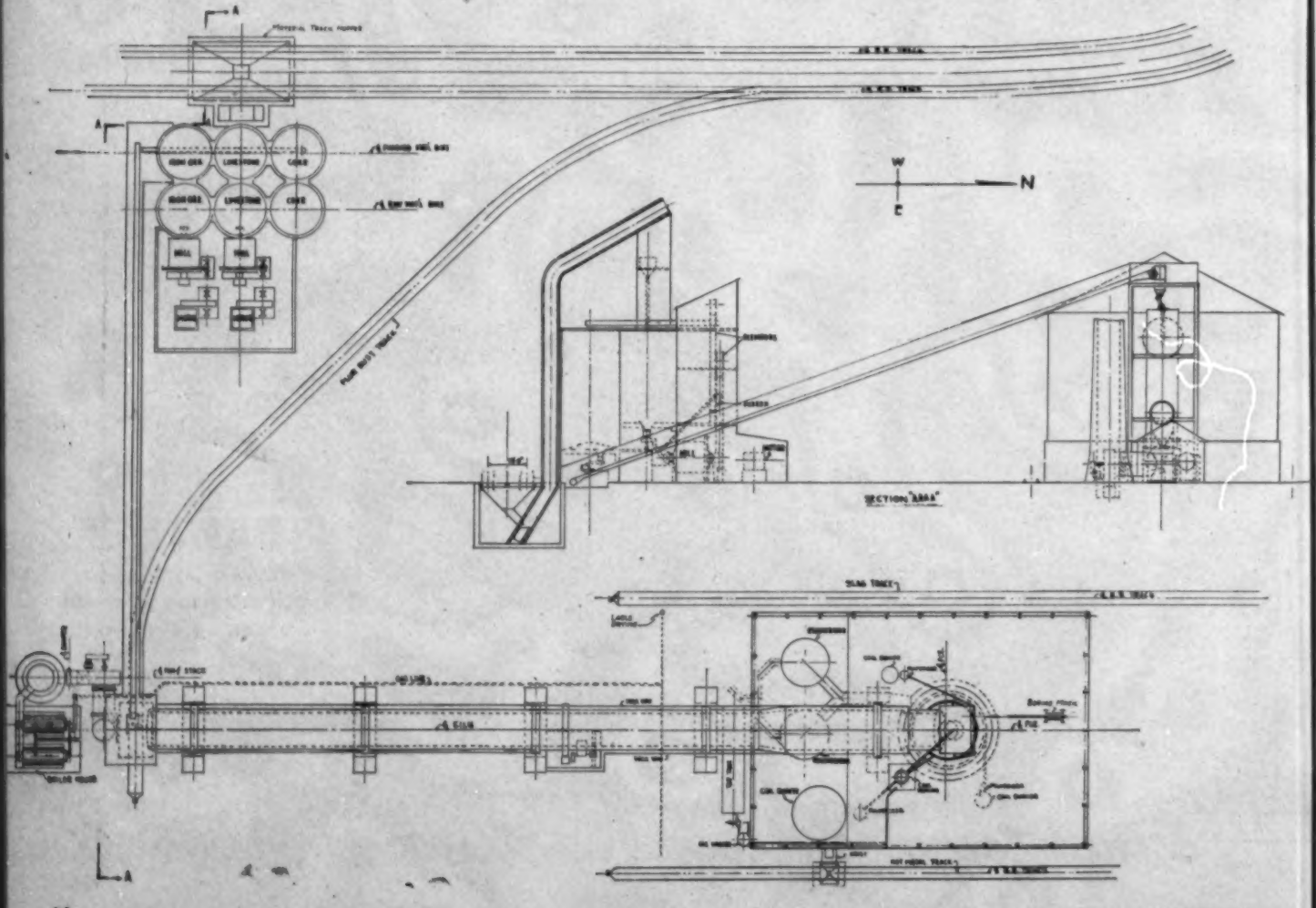
Published statistical reports reveal between four and five weeks' inventory of low-phosphorus scrap is available. In light of these reports the opinion in certain quarters is that electric furnaces and acid open-hearth furnaces have an adequate supply of suitable charging stock.

The term "low phosphorus scrap" as carried under the statistical reports published by the Bureau of Mines, and which are used as index figures on scrap inventory, means scrap of the following composition:

Element	Per cent, maximum
P	0.05
S	0.05
Si	0.50

Sulphur and phosphorus contents of all basic open-hearth steels are considerably under the limitation set in the foregoing analysis. Electric furnace steels and acid open-hearth steels of exacting specifications require phosphorus and sulphur contents considerably under those allowed in the foregoing specification, and usually less than those contained in basic open-hearth steels. This applies to tool steels, stainless steels and steel specialties.

Producers of these grades of steel who employ acid open hearths, induction furnaces, or arc furnaces in which little or no refining is done, consequently require



a charging stock of considerably higher quality than that permitted under the "low-phosphorus" classification, and it is this group of producers who are now suffering from shortages in charging stock. The demand cannot be met by diverting bloom crops from blooming mills for this purpose.

Approximately 100,000 tons per month of high-purity charging stock are in demand for the production of tool steels, stainless steels and steel specialties. This demand can be met by smelting the low-phosphorus ore available in the Adirondack deposits by using the direct reduction process as represented in the Harman process. Certain deposits in the Adirondacks contain substantial quantities of titanium, and as such have been considered as noncommercial for blast furnace smelting. The ores have come to the forefront recently. At North Creek, N. Y., the National Lead Co. has available from its titanium operations approximately 2000 tons per day of vanadium-bearing titaniferous ore which is of the following approximate analysis:

Element	Per cent
FeO	32.0
Fe_2O_3	46.4
TiO_2	9.2
SiO_2	2.4
S	0.16
P	0.003
Al_2O_3	6.4
Cr_2O_3	0.2
CaO	0.6
MgO	1.5
V_2O_5	0.71
MnO	0.23
	99.80
Total iron content	57.4

In addition to the rich iron content of this ore, its chief value lies in its extreme low-phosphorus content, as well as in its vanadium content. This ore smelted in the Harman direct reduction process will yield a metal of the following approximate analysis:

Element	Per cent
C	0.3 to 2.00
Mn	0.32
P	0.006
S	trace
Si	0.20
V	0.73

The vanadium oxide reduces into the metal from which it is recovered in the ladle as vanadium oxide by making additions of mill roll scale, yielding approximately 24 pounds per ton of hot metal produced. The market price of pure vanadium oxide is $1.10 per pound. This price falls off rapidly as impurities increase. However, practice has established that the value of vanadium oxide thus produced is not less than 55 cents per pound. The vanadium oxide may be further reduced in an electric furnace to give 13 pounds of metallic vanadium as ferrovanadium, which has a value of $2.70 per pound of vanadium content.

Eliminate Mass Effect

Vanadium in steel tends to remove the mass effect, and therefore tends to reduce the quantity of other alloys required to impart specific qualities. It also is used at times in lieu of molybdenum which is even more difficult to obtain than vanadium.

Consumption of vanadium in the United States in 1941 was 4,000,000 pounds.

England's need for vanadium is such that British ships burning vanadium-bearing Venezuelan oil are compelled to have their boilers cleaned in home ports, so that the vanadium contained in the soot may be salvaged.

From the 2000 tons per day of vanadium-bearing titaniferous ore available from the National Lead Co.'s operations, approximately 4,000,000 pounds per year of metallic vanadium can be recovered by smelting this ore in the direct reduction process as represented in the Harman process. This production of vanadium will be a co-product with 312,000 tons per year of extremely low-phosphorus charging stock of known composition, which will be sufficiently low in residuals to meet exacting specifications.

Cost of producing this commodity based on 400 net tons per day in pig form, in the vicinity of Albany, N. Y., is briefly as follows:

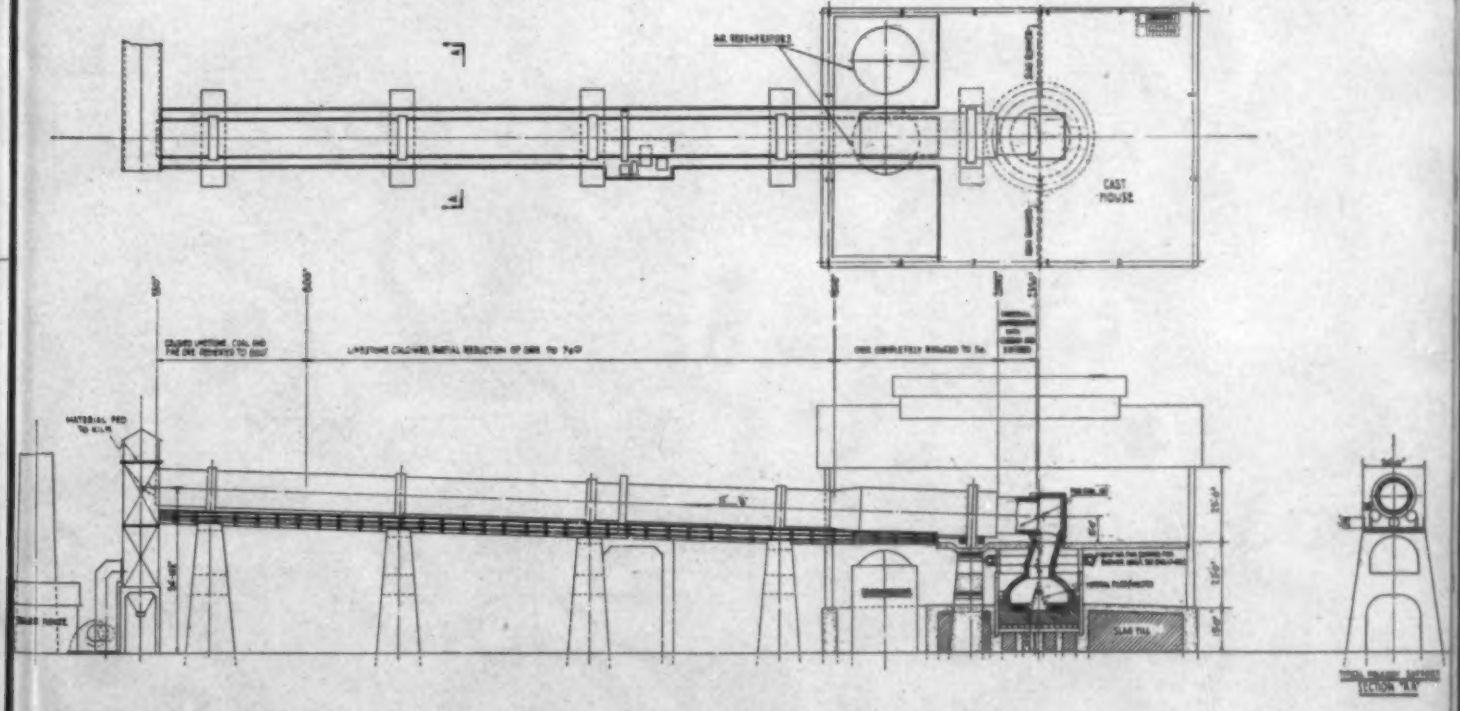
Materials	$14.34
Cost above, including administration	4.54
Total cost, n.t.	$18.88

Corresponding revenue per net ton of charging stock produced, using a sale price of $23.65 per *net* ton, which is the average of $29.50 and $23.50 per *gross* ton for low-phosphorus pig iron and scrap, respectively, will be:

Pig steel or iron, n.t.	$23.65
Vanadium oxide: 24 lbs. @55c	13.20
Total revenue	$36.85
Gross margin, n.t.	17.97

Cost of constructing a Harman process plant for the production of 400 tons per day of charging stock is approximately

Fig. 1. (Left, opposite page)—Arrangement of rotary kiln for sintering ore
Fig. 2. (Below)—General arrangement of vertical circular furnace of melting the aggregate



$2,275,000. Based on 16 per cent amortization, interest, taxes and insurance, the annual fixed charges will be $364,000 or $2.46 per net ton, leaving a net margin of $15.51 per net of steel or iron charging stock produced.

The present market for this vanadium-bearing titaniferous ore will be found in the blast furnace field, where such ore will be blended in small quantities with higher phosphorus ore for blast furnace charges. This has the advantage of lowering the phosphorus content of the pig iron produced, but not to an appreciable extent. The vanadium which reduces into the metal is recovered by making ladle additions of mill roll scale after desiliconizing the metal in the bessemer. However, as the vanadium ore makes up only about 10 per cent of the blast furnace charge, the vanadium recovered is only about 10 per cent of that obtained from a 100 per cent charge of the vanadium-bearing ore, and the economy of the operation is not so attractive; hence, the practice has been discontinued.

Tests on smelting of vanadium-bearing titaniferous sinter in an experimental blast furnace conducted by the Bureau of Mines, and published in report R. I. 3679, discloses that titanium increases the slag viscosity at low temperatures, but decreases the viscosity at high temperatures. In the direct reduction process as represented in the Harman process, hearth temperatures are considerably higher than in the blast furnace, and hence titanium affords an advantage rather than a detriment in the operation of the plant.

The operation of the Harman process for the production of synthetic scrap by direct reduction may be briefly described, as follows:

Ore, limestone and carbon in the form of coal in the proportions of 39:2:5 are dried, crushed to about 16 mesh, intimately mixed and fed into a rotary ore-sintering kiln. The arrangement of this equipment is shown in Fig. 1.

Materials are advanced through the rotary kiln, heated by a hot reducing atmosphere, in the presence of which, reduction of the iron occurs through reaction with the solid carbon in the charge. The entire aggregate is subsequently impregnated with additional carbon, sintered or nodulized, and discharged into a vertical circular melting furnace. The general arrangement of this unit is shown in Fig. 2.

Sintered aggregate is melted in the melting furnace in a slightly oxidizing atmosphere, the impurities passing into the slag which is continuously flushed off while the melted iron settles to the bottom and is tapped periodically. The arrangement of this unit is shown in Fig. 3.

Iron is reduced without reducing the silica in the ore due to the absence of excess carbon. Silica in the ore combines with the calcium in the limestone, forming compounds of calcium silicates.

Manganese and phosphorus in the ore will reduce with the iron.

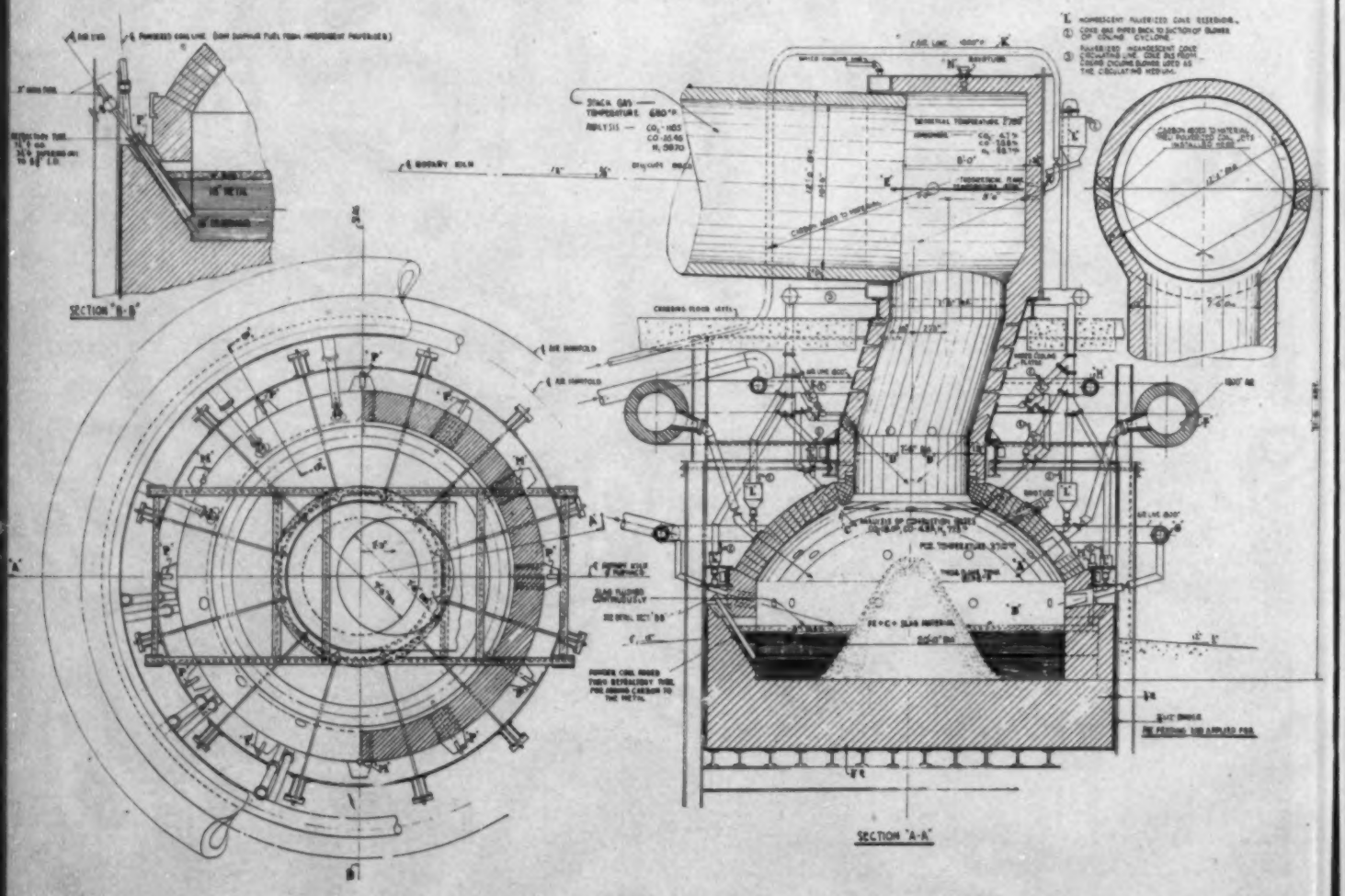
Sulphur in the metal is held to a trace due to the relatively high lime charge and the low percentage of coal required for the metallurgical reactions.

While much of the carbon in the iron is derived from the carbon in the sinter, actual control of the carbon content is secured by carbon additions made directly to the metal bath below the slag. This is kept to a minimum consistent with workable metal temperatures and reasonable FeO loss in the slag.

A certain amount of the iron oxide as FeO up to about 15 per cent may be carried into the melting furnace from the kiln. There will also be a certain amount of iron re-oxidized in the melting operation. To facilitate the recovery of FeO in the slag, a blanket of CO flame is maintained directly over the bath, and unburned carbon is deposited upon the pile of material and into the slag.

Combustion fuel is preheated in a

Fig. 3—Arrangement for tapping slag continuously and the iron periodically



Firebrick Guide

SERVICE	BRAND	TEMP. Use Limit	MORTAR USED	
			HIGH BOND	AIR SEAL AND CUSHION JOINT
EXTREME SERVICE Heavy Loads	**B&W 80** Firebrick	3000 F.	**B&W** Air Set Mortar	**B&W** High-Temperature Mortar
MODERATE TO SEVERE SERVICE where fireclay brick fail quickly, due to temperature, load or both	**B&W** Junior Firebrick	2850 F.	**B&W** Air Set Mortar	**B&W** High-Temperature Mortar
INSULATING EFFECT	**B&W**		**B&W**	**B&W**
	K–20	2000 F.	Smoothset Mortar	K20 Clay
	K–23	2300 F.	Smoothset Mortar	IFB Mortar
	K–26	2600 F.	Smoothset Mortar	IFB Mortar
	K–28	2800 F.	Smoothset Mortar	IFB Mortar
	K–30 Insulating Firebrick	2900 F.	Air Set Mortar	IFB Mortar

R-168

The Company's engineers will be glad to supplement this elementary guide with recommendations on special applications or for unusual requirements of B&W Refractories.

BABCOCK & WILCOX

THE BABCOCK & WILCOX COMPANY
Refractories Division • 85 Liberty St. New York 6, N. Y.

cyclone type preheater. In the operation the hot waste gases from the kiln hood and stack and a small quantity of air are injected into the cyclone tangentially, to give a whirling motion to the gases. Pulverized coal is injected through the top of the cyclone and is heated in suspension to about 650 degrees Fahr., the surfaces of the coal particles being oxidized in the process. Recirculation of the coal is secured by a blower. This permits control of the degree of exposure of the coal to the gases. The coal then passes through recuperator plates where the volatile gases are distilled off and heated to about 1200 degrees Fahr. The surface of the coal particles being oxidized, adhesion or coking does not occur. The recuperator is heated by waste gases circulated through the plates. The arrangement of this unit is shown in Fig. 4. Equipment similar to this was in successful operation for approximately 10 years in the Lakeside plant of the Milwaukee Electric Light & Railway Co., and is fully described in patents 1,954,350, 1,954,351 and 1,954,352.

A set of two regenerators is provided for preheating the combustion air. A temperature range of 1800 to 2000 is maintained by automatic reversal control, and provision is made for a constant flow of air at a straight line temperature of 1800 degrees Fahr.

The melting furnace is fired through 12 large powdered coal burners in which 90 per cent of the furnace fuel is burned, and 12 auxiliary burners set directly below the melting burners and burning 10 per cent of the furnace fuel. The auxiliary burners supply the 100 per cent CO blanket flame over the bath, while the melting burners are set to burn with a deficiency of air, so that one-ninth of the carbon is burned to CO and eight-ninths to CO_2. The average ratio of CO/CO_2 in the gases from the two flames is 20:80 and is maintained by full automatic control.

In addition to the firing burners, there are two sets of carbon jets for injecting incandescent carbon into the combustion gases leaving the melting furnace to reform the CO_2 into CO through the reaction: $CO_2 + C = 2\ CO$. The first set, consisting of 12 jets, is installed through the furnace arch adjacent to the uptake, while the second set, consisting of the same number of jets, is placed in the uptake adjacent to the furnace arch and staggered in their spacing with respect to the jets of the first set. This insures thorough impregnation of the gases.

The heat content of the gases from the melting furnace is insufficient to supply all of the heat required in the kiln. To compensate for this deficit, another burner is installed through the kiln hood. This burner is set to burn with a high CO flame. To simplify the control of atmospheres, the burner is adjusted so that the analysis of its combustion gases is the same as that of furnace gases after being reformed by carbon.

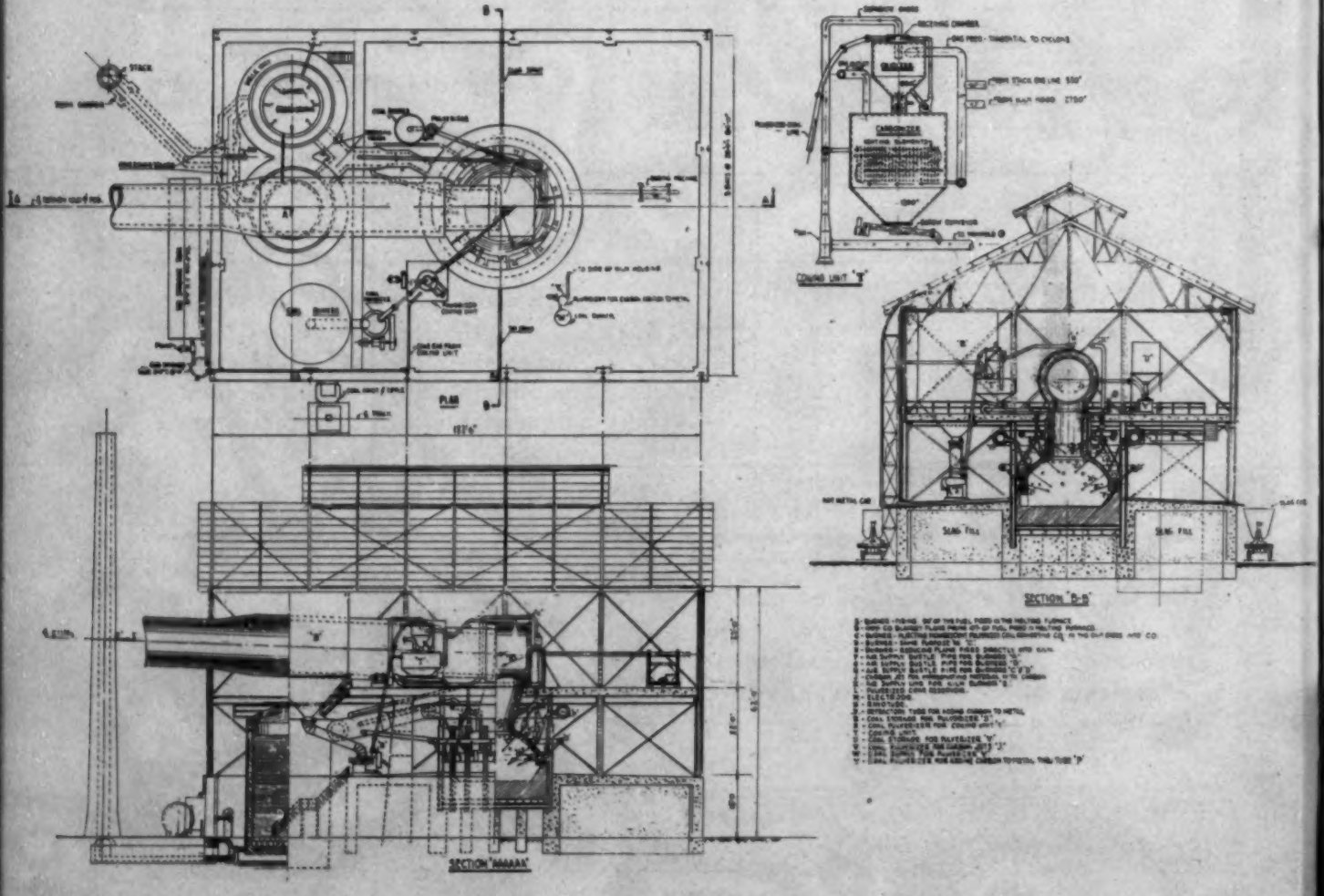
In addition to controlling the temperature reversal cycles in the regenerator, complete combustion controls are installed on the hearth and kiln burner.

The air flow to the main firing burners in the melting furnaces is controlled through a Rayotube installed in the roof and set for about 3000 degrees Fahr. The air flow to the CO flame blanket, as well as the air flow to the jets for injecting incandescent carbon for the reduction of gases leaving the hearth, are controlled in proportion to the air flow to the main firing burners. The fuel flow will be automatically proportioned to the air flow. In this way, the ratio of the carbon monoxide to carbon dioxide content of the gases in both furnaces is automatically held at the desired point.

When the temperature of the melting furnace reaches 3000 degrees, the fuel input is automatically reduced. As

(*Please turn to Page* 102)

Fig. 4—Arrangement of the coal preheater and carbonizer



A SWING FRAME OPERATOR STANDS BY AS EVERY VICTORY SHIP IS LAUNCHED

★ ★ ★ FROM mast to keel, a ship is steel! Behind the splash of every ship's launching stands the steel mill foremen and operators. Without their efforts, there could be no ships to slide down the ways.

If more ships have been launched than ever before, it is because there have been record-breaking amounts of billets available. Billet grinding, for example, has been faster . . better! Therein lies the story of the participation of the "Wheels of Industry" in the steel mills' war effort.

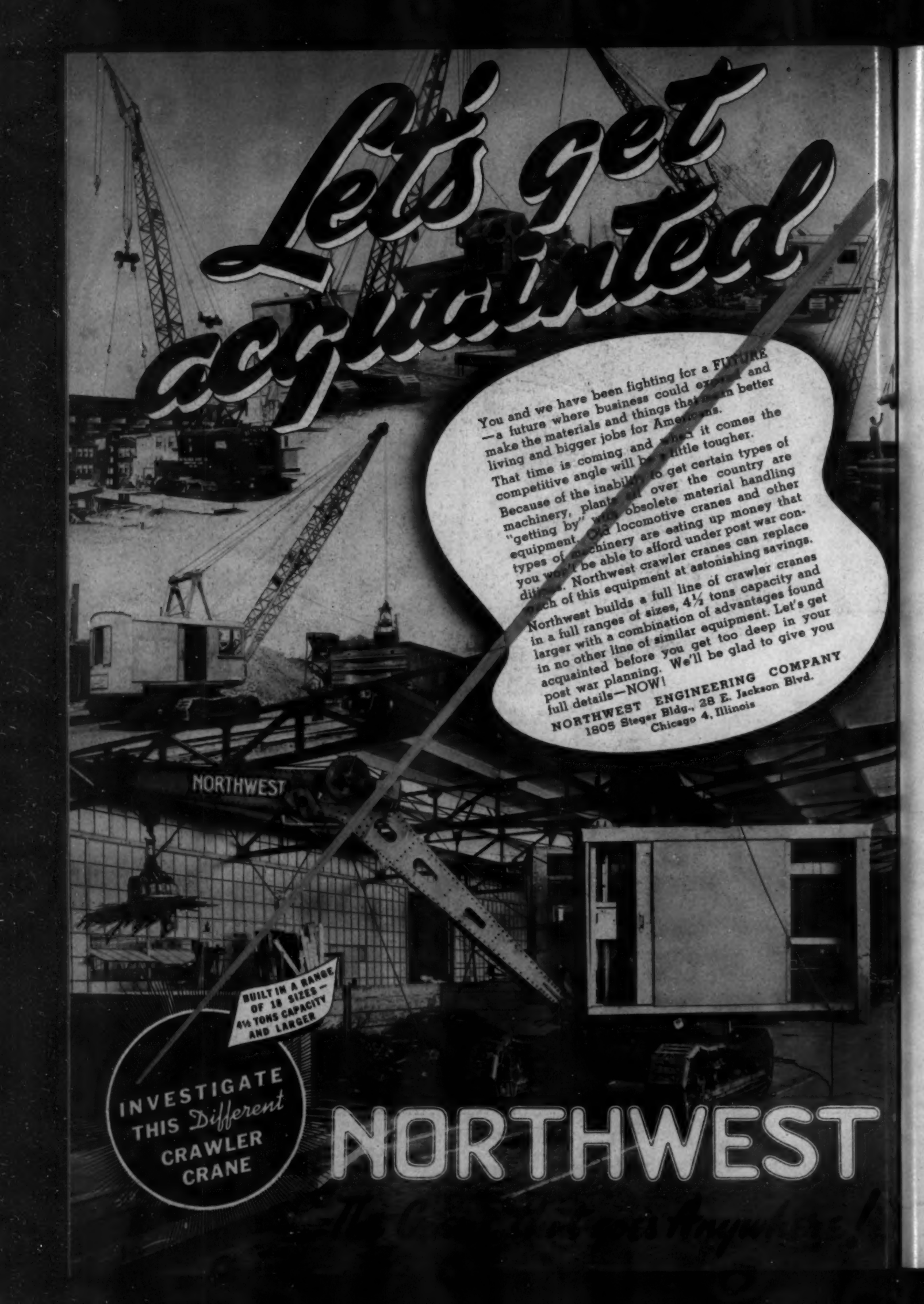
Sterling Grinding Wheels have had a lot to do with rushing billets through grinding departments. Built to do a specific job, they have been a great aid in breaking production records. They handle easily, do a fast grinding job, and last longer. Operators and foremen like them.

Back of the extra service performed by Sterling Grinding Wheels stands the "know how" of our engineers. There is one in your territory to solve your hard-to-lick problems. May he call at no obligation and give you some of his ideas? It will pay dividends!

· STERLING ABRASIVES ·

THE STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY


Let's get acquainted
You and we have been fighting for a FUTURE —a future where business could expand and make the materials and things that mean better living and bigger jobs for Americans.
That time is coming and when it comes the competitive angle will be a little tougher.
Because of the inability to get certain types of machinery, plants all over the country are "getting by" with obsolete material handling equipment. Old locomotive cranes and other types of machinery are eating up money that you won't be able to afford under post war conditions. Northwest crawler cranes can replace each of this equipment at astonishing savings.
Northwest builds a full line of crawler cranes in a full ranges of sizes, 4½ tons capacity and larger with a combination of advantages found in no other line of similar equipment. Let's get acquainted before you get too deep in your post war planning. We'll be glad to give you full details—NOW!
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NORTHWEST
BUILT IN A RANGE OF 18 SIZES — 4½ TONS CAPACITY AND LARGER
INVESTIGATE THIS Different CRAWLER CRANE
NORTHWEST

Shell Forging

(*Concluded from Page 86*)

the chair, thrusting both downward together, the punch entering the billet.

On the right in Fig. 9, the action is complete, the press is closed and the punch has performed its office. It would be hard to conceive of any arrangement better calculated to eliminate that bugaboo of the piercing operation, eccentric carcasses. The billet having been thrust well and truly into the pot, die and chair are locked in a close embrace thus giving the rigidly guided punch little option but to pierce a hole exactly centered in the billet. Rapidity of the action is limited only by press speed, no delay occurring between the process of ramming the billet home and entry of the punch.

Those less familiar with the problem of forging a round and concentric shell body might well inquire why such precautions are necessary. The answer lies in the readiness with which a piercing punch will take advantage of a small difference in temperature between one side of the billet and the other, and then proceed to wander to the hotter side where it encounters less resistance. Its the old story of "seeking the path of least resistance." It is for this reason that many shell forgers prefer the type of furnace used in this plant. The billet being stood on end, surrounded at all times by the hot gases of the furnace, and exposed equally to radiation from all sides, tends to produce a uniformity of temperature that is hard to attain when the billet is laid on the hearth. Further, the period of rotation having been set, the judgment of the operator ceases to be a factor.

"Muffs" Control Cooling

Fig. 6 shows the pierced cup being pushed to the right through the rings in the draw bench and out onto the table in the center where the operator at the right waits with tongs to pick it up and place it in the "muff" shown in Fig. 7. Rollers are not here in evidence, three draw rings are necessary and sufficient.

One operator serves the vertical press. He puts the billet in position and manipulates the hydraulic controls. A second member of the press crew removes the billets from the press and places them on the draw bench; while a third operates the draw bench and a fourth takes the finished forging from the bench and places it in the cooling conveyor. Nine men are required for heating and forging.

On a recent visit to Ambridge, the writer was impressed with the speed with which the forging crews worked and commented on the fact. The payment plan followed a familiar pattern, except that a steep rise in bonus occurs after the first 100 shells in excess of daily stint.

It is curious fact which even a keen student of human nature finds hard to interpret, that the ends of maximum production appear to be best served by high money incentives. At least this is true of that class of labor intent on getting ahead in the world and not content with bare sufficiency. A watch has to be kept on health, lest weariness of body finally overtake willingness of spirit.

From the draw, the billets are placed in the insulated containers called "muffs" shown in Fig. 7 to ensure slow cooling and hence put the steel in good condition for machining and nosing. After turning black, the forging is removed from the muff and allowed to roll down a short incline on to the conveyor which pushes it on a hook for further cooling.

There are 225 muffs altogether on the cooling conveyor. Since these are arranged in pairs, the total accommodation is 450. There are also 450 hooks, two hanging on the cooling conveyor just below each muff. Conveyor speeds are adjusted according to forging size, the 75-millimeter forgings, for example remaining in the muffs 1 hour and 15 minutes—sufficient time for all color to disappear and the steel to pass through the critical range. Another hour and 15 minutes on the hook brings the forging virtually to handling condition. The 5-inch forgings take longer—1 hour and 45 minutes in the muff and another hour and 45 minutes on the hook. These larger forgings are finally cooled by water spray prior to inspection.

Each shell is examined for alignment. Inspection of the cavity follows. Mode of handling the shell forgings inside a boxcar is shown in Fig. 8.

The types of steel used for the forging tools are exhibited in Table I. Typical tool life figures are also given in Table I. The figures given for the draw rings relate to their first use only. All new draw rings are prepared for the smallest size in working 75-millimeter shell. When worn after about 25,000 forgings, the ring is annealed, machined to the next larger size, then hardened. This process repeated for the smallest size, the ring thus having a total life in working 75-millimeter shell of 75,000 forgings. It is then similarly employed in drawing the 105's and thereafter the 5-inch. Thus an exceptionally small amount of die steel is used for draw rings.

The hydraulic system in this plant presents certain features of interest and exemplifies the readiness with which available materials have been adapted. The hydraulic system is of the closed type, the fluid being a soluble oil solution operating under a pressure of 1000 pounds per square inch. There are eight motor-driven centrifugal pumps, each having eight stages.

Since conventional air bottle accumulators could not be obtained, the 40 bottles of which the accumulator is made were constructed from commercial seamless pipe, 13¾ inches in diameter with 0.600-inch wall thickness. One pump and a portion of the accumulator system are shown in Fig. 10. Seventeen of these bottles are placed in the vertical position and are partly filled with water, whose level fluctuates depending upon supply and demand. These 17 bottles are all connected together at the top and the header to the horizontal bottles which contain air only. This flexible and relatively inexpensive system supplies all the need of the five forging units.

Fig. 10—One pump, lower left, and portion of accumulator system made from seamless pipe instead of conventional air bottles, 40 such pipes being used. Of these, 17 are vertical and partly filled with water, others are horizontal and contain air only. Vertical bottles are connected to common header which runs to horizontal bottles

Welding the "Big Inch"

(*Concluded from Page 65*)

possible by the tractor. Now the clamp is shifted until it centers exactly on the joint; pipe ends are carefully aligned and the clamp securely fastened.

When the clamp is in place, the pipe joint lies squarely between the pair of rings with sufficient space between to allow tack welding of the joint. Upon completion of the tack weld, another dolly is slipped under the new length and additional pipe lengths are added in the same manner until a section of the required length is reached. Now roll welders move in to make the continuous welds.

The first pass in roll welding "Big Inch" sections is made with 3/16-inch "Fleetweld 5" electrodes at 200 amperes. In making subsequent continuous welds, the clamps are removed and the operator is assisted by one of the crew who rotates the pipe on the dollies. It is revolved slowly from the operator to facilitate making a continuous downhand weld. At the left in Fig. 2 is shown a part of the simple device used for this purpose—a length of chain, a clamp and 15-foot lever which enable one man to turn the long section easily.

Second pass in finish welding calls for ¼-inch electrode at 325 amperes; the third is made using 5/16-inch welding electrodes with an instrument setting of from 375 to 400 amperes. When completed, the weld—in the parlance of the men—is "penny wide and nickel high". Each roll welder marks his weld with a stencil. If inspection reveals any pin holes, they are rewelded by the operator before he leaves that section of pipe.

As illustrated in Fig. 2, the roll welding is protected from wind and weather by a three-sided sheet metal shield shaped to the pipe and opening toward the operator. It is held in a fixed position on top of the revolving pipe by a light steel rod with one end attached to the shield and the other sunk in the ground.

As the main line of the "Big Inch" presses forward and a new section is needed, two tractors pick it up and carry it to the edge of the excavation. The tying-in of a new section at the end of the pipeline is accomplished by a crew devoted solely to that job. The tractor closest to the end of the main line edges forward with its part of the section until several feet of the pipe extend over the parapet of the trench. The men raise the fixed end of the pipeline until the two sections are in fairly close alignment. A pipe clamp, previously attached to the "Big Inch" section, is slid into place, the pipe ends are fitted into the clamp, and the joint carefully aligned. Fig. 5 shows members of the crew standing on both sections to aid proper alignment while initial tack welds are applied at the joint covered by the clamp. Final tying-in is done by two operators shown at work in Fig. 6. Fig. 7 shows the welds completing this huge transportation artery at Phoenixville, Pa., in the closing days of July.

Fig. 7—Oil was already flowing through the Texas-to-Illinois leg of the "big inch" when this gang late in July completed the last weld on the eastern leg near Phoenixville, Pa.

To safeguard against corrosion, certain sections of the "Big Inch" were given a protective wrapping. In fact, all of the pipe "laid" from the point of beginning at Longview, Tex., to a place near central Ohio, as well as portions in Pennsylvania and New Jersey, were so protected. This work was planned and directed by Johns-Manville representatives. Machines used were developed exclusively for such operations.

First, a power-driven cleaning and priming machine is fitted around the pipe. This has a rotating head containing cutters and wire brushes which remove oil, grease, mud, welding and shop scales. During the same operation, a second revolving canvas band, attached to the rear of the machine, applied a coal tar primer to bond the protective enamel coating which is later spread on the pipe. About 2000 feet behind this first unit comes the coating and wrapping machine. Self-propelled, it applies a uniform coating and a layer of asbestos wrapper in one operation. After the pipe is covered, wide canvas slings and padded skids prevent damage in further handling.

At river crossings, through eight of the larger streams, additional coatings of enamel and wrappings of asbestos felt were applied. By binding wooden slats around the completed job this wrapping was so well protected that the pipe could be pushed-pulled across rivers without harm to its "overcoat".

To "push" the oil through the 1400-mile line of pipe, there are 29 booster stations at 50-mile intervals each employing three single-stage centrifugal pumps and each of these driven by a 1500-horsepower squirrel-cage motor.

Line pressure is 725 to 740 pounds per square inch. Rate of flow is 4.5 miles per hour, taking 5 days for a shipment to go from Longview, Tex., to Norris City, Ill., 14 days to New Jersey.

Disaster, such as that occurring to the line last winter when the section under the Mississippi river was washed out, will be minimized by the presence of a second auxiliary line (when built) of somewhat heavier steel under all large rivers crossed. To prevent loss of oil when a river section gives way, gigantic gate valves are installed at river crossings where they can be closed quickly at the first sign of trouble.

Welding Operators Offered Vest Pocket Guide

Different types of faulty welds, and how to correct these faults are explained pictorially in a vest pocket guide, being offered to all welding operators by Hobart Brothers Co., Troy, O. It suggests and illustrates all kinds of joints, fillet welds, and points out how to cut electrode waste. It explains the three essentials of proper welding procedure, welding symbols and carries a trouble check chart on welding machine troubles.

MERCURY

Material Handling Equipment

Speeds Production on the Industrial Front—

Elevating Platform Trucks

Mercury Elevating Platform Trucks are available in the following models:

"Junior" Models: Low and high lift types. 4000 lbs. capacity. Compactly designed for work in confined areas.

"Senior" Models: Low and high lift types. Rugged design, 4000 lbs. capacity.

"Standard" Models: Low and high lift types. 6000 lbs. capacity. Sturdy, rugged design.

Fork Trucks

"Jeep" Sit Down, Center Control Fork Truck. 2000 lbs. capacity. Compact design affords easy manipulation in confined areas.

"Yak" Center Control Fork Truck. 4000 lbs. capacity. Rugged design.

"Yank" Center Control Fork Truck. 6000 lbs. capacity. Designed for tough continuous service.

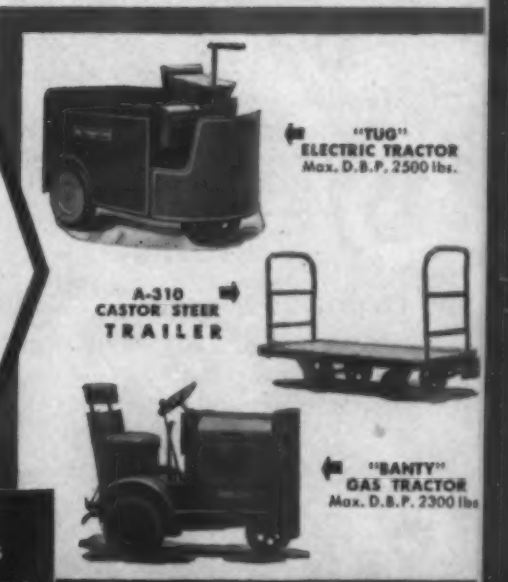
Tractors—Trailers

"Tug" Electric Tractor: A powerful compact tractor available in "twin-wheel", and "4-wheel" models, medium or heavy duty

"Banty" Gas Tractor: The most compact tractor made, yet develops a draw bar pull in excess of 2000 lbs. Thousands now in use.

Trailers: Available in castor or 5th wheel steer, platform or side dump types.

For detailed information on Mercury tractors, trailers, and lift trucks, request Bulletin-230.



MERCURY TRACTORS TRAILERS LIFT TRUCKS

MANUFACTURING CO. 4140 S. Halsted St. Chicago

INDUSTRIAL EQUIPMENT

Multi-Versal Machine

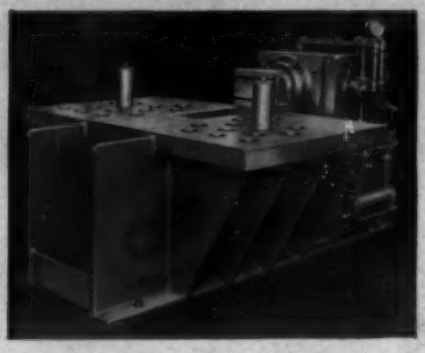
Hack Machine Co., 1226 Harding avenue, Des Plaines, Ill., is offering a new No. 10 heavy-duty Multi-Versal designed to machine intricate aircraft parts and tools. Five additional operations can be made with this model besides those featured in the company's regular models.

Operations include: Spiral milling, gear hobbing, universal boring bar work, form tool generating and thread milling. The machine has a high speed range suitable for jig boring as well as low speed range with ample power to pull an 8-inch face mill. The master head is a self-contained horizontal milling unit, receiving its power through a V-belt from

a motor adjustably attached to the master head. Eight back-geared speeds suitable for driving cutters, ranging in size from a ¼-inch end mill to an 8-inch face mill, are provided. The master head can be elevated within the ram by means of either hand or power feed. It also serves as a carrier for all removable attachments and is fitted with a central boss about the spindle which serves to centrally locate attachments. The raised face of the head has a series of tapped holes accurately spaced about a circle which serves as clamping means for various attachments. The No. 10 model also includes a spring counterbalanced reciprocating rear ram—a feature incorporated in all of the company's models.

Hydraulic Bender

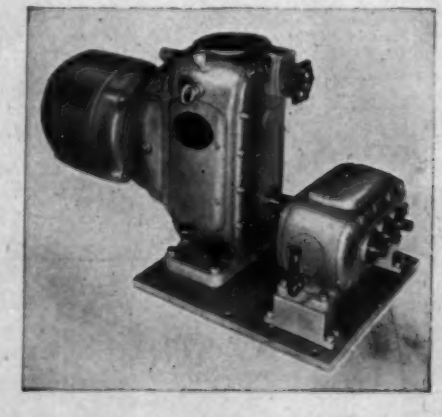
Beatty Machine & Mfg. Co., Hammond, Ind., has developed a hydraulic bender for pipe bending, straightening, pressing and miscellaneous forming of light structural and welded shapes. Specifications applying to this press are: Advance and pressing speeds, 40 inches per minute;



return speed, 130 inches per minute; maximum operating pressure, 2000 pounds per square inch; table (front to back), 42 inches; (right to left) 72 inches; ram, 12 inches wide by 9 inches high. T-slots are provided for mounting dies. The table has 26 holes for locating 4-inch diameter bending pins in various positions on the table to facilitate bending and straightening of odd shapes. This type press is available in capacities from 35 to 200 tons.

Portable Test Rig For Aircraft Testing

Link-Belt Co., Philadelphia 40, has developed a portable test rig for testing vibrators, pumps, instruments, etc. The unit, arranged compactly on a drilled flat steel base that makes it portable, has a vertically-mounted 2-horsepower motorized P.I.V. gear of 6:1 overall speed range. This is connected to a helical gear box having three output shaft extensions

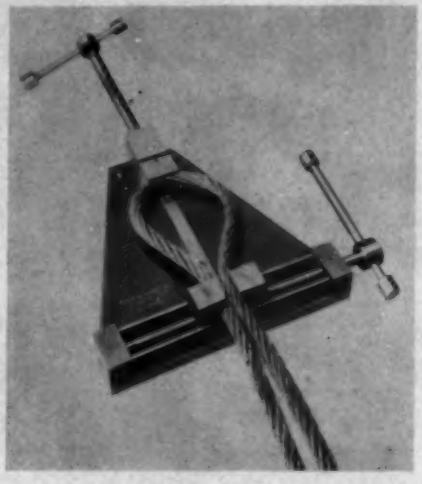


for testing, and a fourth extension, on the opposite side of the box, for connection to a tachometer. The three output shafts in line have speed ranges of 600 to 3600, 300 to 1800 and 150 to 900 revolutions per minute, respectively. A triple-scale indicator is used for the three speed ranges. The speed range of the shaft extension for tachometer is 150 to 900 revolutions per minute.

Speed of each shaft can be minutely varied by turning the hand regulating wheel. The larger hand wheel operates the vernier control of the unit by means of which still finer and more precise speed control is possible.

Portable Rigger's Vise

Patrick-McDermott & Co., 1645 East Slauson, Los Angeles, announces a portable rigger's forming vise to handle wire rope and cable from ⅜ to 1¼-inch diameter without adapters. Splicing and clamping operations as well as the forming of cable into an eye or around a thimble are accomplished in a minimum



amount of time with the aid of the device whose screw shaft levers give complete, easy jaw and back control. The vise, equipped with guards to protect against cable and thread friction, is of durable construction and weighs approximately 50 pounds. It has a base length of 15 inches and a base width of 14 inches—adding convenience in handling.

Electronic Time Relay

Durakool Inc., Elkhart, Ind., announces a new adjustable electronic time relay for controlling industrial processes in which extreme accuracy and long-lived performance are required. It consists of a combination of two hermetically sealed units, each of which are safe both in explosive and corrosive atmospheres.

Principle of operation of the development is electronic, and the load is carried by a quick acting mercury relay. The only moving part in the unit is fast-operating steel-encased plunger working in a hydrogen pressure atmosphere displacing the mercury. Time settings

(All claims are those of the manufacturer of the equipment being described.)

ALL 3 NOW
FIGHT WIN PLAN
to be ready WHEN THE SHOOTING STOPS*

This message is especially for INDUSTRIAL EXECUTIVES who are very busy producing war goods.

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along with extensive facilities for bettering anything made from metal . . large or small Parts . . . Complete Assemblies . . . experimental pieces or mass production.

AFTER VICTORY

The genius that America contributes in the all-out Fight to Win can also (and at the same time) do a third thing: Plan, in a practical way, for the peace.

In our own small way we at Spriesch have been planning to help other manufacturers, After Victory. The Spriesch organization is not just another miracle war plant. Long before Pearl Harbor, we were said to be performing miracles, in the manufacture of bomb-releasing mechanisms for fighting aircraft.

Right NOW we seek contact with those to whom "All 3 at the same time" is feasible. They will like to consider using part or all of our facilities for "bettering anything made from metal" such as:

Combined engineering-dies-tools-parts or complete assemblies service...Designing and making Special Machines . . . Initial, periodic or continuous recommendation for product improvement or production procedure . . . Help on What to make After Victory. Distance will present no insurmountable barriers to rendering these services.

Industrial Executives are invited to write NOW (on business letterhead please) for our newly printed booklet, "After the Shooting Stops" and for our 36-page plastic bound brochure titled "Ingenuity." The latter illustrates and describes our extensive facilities. Frankly, we think you'll be pleased.

Joseph J. Cheney, President.

Established 1923

Spriesch TOOL & MANUFACTURING CO., Inc.

22 HOWARD STREET • • BUFFALO 6, NEW YORK

Ad No. 20

** This is a collection of articles inspired by the activities of the Spriesch organization which appeared recently in The Monetary Times, Canada, in the magazine Steel and in Printers' Ink.*

Five Brothers*..

..and an Idea

IT ISN'T OFTEN that an idea created in the minds of boys will materialize in later life. With the five Turner brothers, William, Cort, Frank, Charles, and Robert, their boyhood idea that some day they would be in business together, overshadowed all the obstacles of hard work, and study to make this idea a reality. ★ Finally in April 1939 they purchased their first grinding machine and formed their own company. From this modest beginning they gradually won recognition among manufacturers for precision-built gauges. This recognition made expansion necessary, and today their company occupies one of the most modern buildings for the manufacture of gauges in the country. ★ The ℙ stamped on a gauge represents a product backed by the integrity of five brothers and their practical knowledge of precision gauges.

**Since May 7, 1942, William Turner, of the U. S. Navy, has been reported missing in action in the Coral Sea Battle.*

The Stamp ℙ of Precision

TURNER GAUGE GRINDING COMPANY

2630 HILTON ROAD • • FERNDALE, MICHIGAN

are continuously variable within the range and may be adjusted easily. Standard models cover time ranges from 0.05

to 0.5, 0.10 to 10, and 1 to 100 seconds respectively. Contact capacities are offered up to 75 amperes, either normally open or normally closed.

High-Speed Spot Welder

Control of pressure, weld, hold and off time, and speed up to 110 strokes per minute is entirely automatic on the new P-20 automatic press type spot welders introduced recently by Pier Equipment Mfg. Co., Benton Harbor, Mich. Unlike the manually foot-operat-

ed welder, no effort by the operator is required. The machine provides for variations in the cycle to suit welding job.

The upper electrode of each unit is actuated by a double-acting air cylinder, and electrode pressure range is adjusted by an air-pressure valve. Current may be adjusted from 50 per cent of maximum to 100 per cent by an 8-point selector switch.

Made in two capacities, 20 and 30 kilovolt-ampere, the machines are being offered with throat depths of either 12 or 24 inches.

ARE YOU WELDING STAINLESS STEEL?
HERE'S *New Light* ON THE SUBJECT

This book can save you time and avoid spoilage of vital alloys, both more than ever essential to the war program today. Describes and illustrates equipment, procedures, precautions. Request copies on your company letterhead, please.

ADDRESS DEPT. S-8

SUCCESSFUL stainless steel welding, as many a shop has found out the hard way, puts a premium not only on knowing what to do, but also what to avoid doing—and why.

That is because the problem, first of all, is a double one as compared to ordinary carbon steel welding, since it calls for maintaining the corrosion resistance of the parent metal across the weld area, as well as its strength. Furthermore, although stainless steel welds easily, the various members of the stainless family differ considerably from carbon steel—and even from each other—in the physical and chemical phenomena they exhibit during the welding process.

Information, clear and complete, is the basic answer. We've supplied it in a new 64-page, full-color booklet, *"Welding Stainless Steels,"* covering all the commonly-used hand or machine methods of welding Allegheny Metal. Employing a new idea in graphic illustration, this book is, we believe, the most complete and understandable coverage of the subject yet published—a welding shop "bible" purposely made so clear and simple that it is also ideal for student training. ● *Write for your copy (see at left).*

Allegheny Ludlum
STEEL CORPORATION
BRACKENRIDGE, PENNSYLVANIA

A-9078 . . . W&D

1st Birthday of the M-7
American Chain & Cable Co., N. Y.
American Chain Div.
Hazard Wire Rope Div.
American Locomotive Company
Thank you

Thank you, American Locomotive, for listing our American Chain Division as one of the 445 organizations which united to build the M-7—the "tank killer." • We were pleased to find that 139 of these concerns use American Chain, in their own products, or in manufacturing them. • Friendly cooperation of business men has helped to make America great. That spirit will make us a greater nation than ever, following the war.

AMERICAN CHAIN DIVISION

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In Business for Your Safety

AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT • CONNECTICUT

Direct Reduction

(*Continued from Page 92*)

a result of this decrease in the fuel input to the melting furnace, the temperature of the gases passing from the furnace to the kiln drop, and the fuel input to the burners firing directly into the kiln is increased by the temperature impulse set up by the Rayotube in the kiln hood. This operation is further explained as follows:

The pile of material shown in the melting furnace (Fig. 3) is carbon impregnated iron and slag sinter. The pile is maintained at such a height as to prevent buoyancy and to provide melting surface for the melting flame. The desired height is maintained by controlling the rate of material flow from the kiln and the amount of fuel fired for melting the material.

A reservoir of about 18 inches of metal is maintained in the bottom of the furnace at all times. This metal acts as a mother liquor. The tap hole or iron notch is located on a level with the top of the metal reservoir.

Additional carbon is added to the metal as required, through the refractory tubes "P". Electrodes are installed at points "M" on the plan for the purpose of insuring sufficient temperature of metal at all times. The refractory tubes for carbon are omitted at points "M" when electrodes are installed.

Flame "A" fired from 12 burners, equally spaced around the circumference of the furnace arch, is the melting flame, firing 90 per cent of the fuel. This flame is slightly oxidizing with 8/9 of the carbon burning to carbon dioxide and 1/9 to carbon monoxide.

Flame "B" fired from 12 burners directly below the "A" flame burners, is a 100 per cent CO flame and also impinges unburned carbon onto the material pile and surface of the bath. This flame acts as a carbon monoxide blanket through which the heat from flame "A" radiates.

Burners "C" located directly above the "A" flame burners, inject incandescent pulverized coke for converting the carbon dioxide in the exit gases into carbon monoxide. The burners "D" are for the same purpose. They are staggered with respect to "C" burners and give the effect of carbon depth or a carbon bed to insure impregnation of the exit gases.

Burner "E" furnishes a highly reducing flame. As it is fired with 1800-degree air and incandescent coke it will also be of a relatively high temperature.

The combustion controls for firing the furnace and kiln are as follows:

A Rayotube installed in the roof of the melting furnace furnishes impulses when the reflected temperature varies from normal. The air supply to the bustle pipes "F", "G" and "H" is varied by butterfly valves operated from the impulse set up by the Rayotube.

Incandescent pulverized coke is fed to coke reservoirs "L" by a blower, using the exit gas from the cyclone of the coking unit as a conveying medium. The gas is tapped off from the reservoirs "L" and piped back to the coke cyclone, or to the suction of the blower drawing gas from the cyclone. Incandescent coke

speedometer not needed . . .

One of the most important factors in accuracy of gun-fire today is the velocity at which a shell travels.

Formerly, variations in the structure and dryness of the powder made great differences in shell velocity . . . and hence, made accurate gun-fire correspondingly difficult. ●

Today—thanks to technical advances in powder-making *plus air conditioning*—there is so little variation in powder that gunners can know *exactly* what shell velocity will be. Result—a more accurate gun-fire that has already contributed to important American victories.

Air conditioning keeps powder at the correct temperature and humidity levels, not only in the making of the powder, but also in storage places ashore and in powder magazines on shipboard.

To meet exacting requirements like this, General Electric engineers have developed *air conditioning* and *industrial refrigeration* equipment that is more efficient, more compact, more flexible.

Now devoted to war, these improvements will be turned to innumerable peacetime uses when hostilities cease. Now for war . . . later for peace . . . turn to General Electric for efficient, compact air conditioning and industrial refrigeration.

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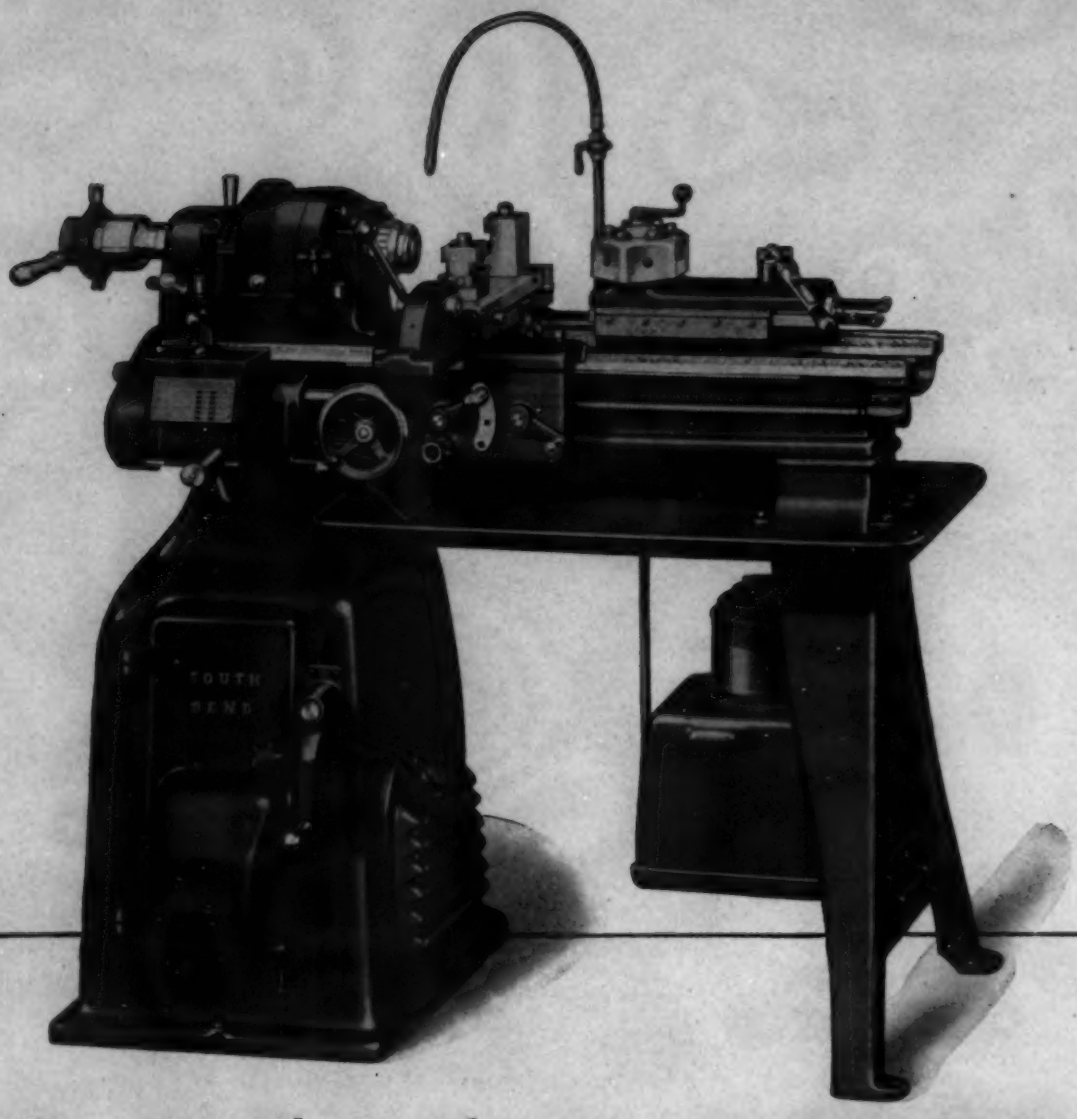

For Rapid Machining
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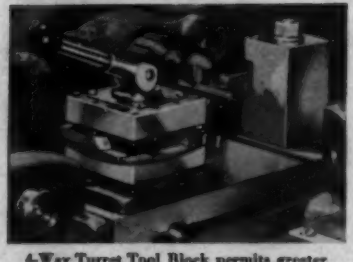
In hundreds of important war production shops the new Series 1000 South Bend Turret Lathes are first choice for machining small precision parts. Highly efficient on all work within their capacity, these lathes are especially popular for close-tolerance, second operation jobs.



4-Way Turret Tool Block permits greater number of operations per setup. Indexes to 4 positions. Optional equipment.

Compound Rest Cross Slide, interchangeable with Handlever Cross Slide, is also supplied as regular equipment.

SPECIFICATIONS

Hole through spindle	1⅜″	Spindle speeds (12)	50 to 1357 r.p.m.
Collet capacity, round	1″	Thread cutting feeds (48)	4 to 224 per inch
Swing over bed and saddle wings	10⅛″	Universal carriage power feeds—	
Effective feed of turret slide	4″	longitudinal (48)	.0015″ to .0836″
Turret face to spindle, max.	19⅛″	transverse (48)	.0006″ to .0309″

South Bend Turret Lathes, Engine Lathes and Toolroom Lathes are made in a wide range of sizes and types. Write for catalogs and the name of our nearest dealer.

SOUTH BEND LATHE WORKS

LATHE BUILDERS FOR 36 YEARS — SOUTH BEND, INDIANA, U. S. A.

Helpful Literature

1. Drilling Machine

Baker Brothers, Inc.—4-page illustrated bulletin No. 1007X describes and gives full specifications of model No. 422 heavy duty drill. Machine is of single purpose type with spindle speeds and feeds secured by means of pick-off feed and speed change gears. Machine is adapted to drilling, counterboring, facing, forming or tapping operations.

2. Testing Machine

Baldwin Southwark Div., Baldwin Locomotive Works—8-page illustrated bulletin No. 154 describes "Carpenter" torsion impact testing machine which can be used for evaluation of hardened tool steels, testing quality of brittle materials, testing for surface corrosion, and for proofing materials and members such as axles and shafts subject to impact torsion.

3. Abrasive Wheels

Bay State Abrasive Products Co.—4-page illustrated bulletin on snagging wheels shows by enlarged sections, abrasive grit size, hardness grade, porosity of resinoid B bond, vitrified 6 bond and vitrified H9 bond of wheels for high and low speed operation. Wheel recommendations for snagging various materials are tabulated.

4. Heavy Machinery

Blaw-Knox Co.—12-page illustrated broadside No. 1918 depicts typical products of company which are being used in furthering the war effort. Such equipment as gun slides, industrial piping, grating, synthetic rubber plants, steel power transmission towers, steel concrete forms, naval vessel equipment, armament castings, alloy ingots, aircraft equipment, anti-aircraft guns and rolling mills are described briefly.

5. Belt Fasteners

Bristol Co., Mill Supply Div.—4-page illustrated bulletin No. 733 deals with line of steel belt fasteners which provide simple means for joining leather, cotton, woven or rubber belts. Sizes and styles are available for practically all belting applications. Briefly covered, also, are multiple-spline and hexagon socket set and cap screw.

6. Vibration Testing

All American Tool & Mfg. Co.—5-page illustrated catalog F is descriptive of three models of vibration fatigue testing machines which produce adjustable cycles of 10 to 60 vibrations per second for checking vibration resistance of products ranging up to 100 pounds in weight. Acceleration or rate of change of velocity test can be made. Frequency is accurately recorded on sensitive tachometer.

7. Pipe Templates

Air Reduction—12-page illustrated booklet is entitled "Pipe Templates for Welded Fittings." Booklet tells how to fabricate fittings for welded piping installations by means of flame cutting and welding. Templates and procedures described are intended primarily for use where special fittings are required or where stock welding fittings may not be available when needed.

8. Colloidal Graphite

Acheson Colloids Corp.—4-page illustrated bulletin No. 421 discusses use of "dag" colloidal graphite for assembling and running-in engines and machinery. Coating of colloidal graphite is so thin that it does not measurably reduce initial clearance between mating parts. Particles work into bearing itself and become absorbed into metal surface.

9. Metal Parts

American Brass Co.—8-page illustrated "Anaconda" publication B-9 is prepared for manufacturers whose products embody metal parts of complicated, irregular designs. Described are "Anaconda" hot pressed parts or pressure die castings which are offered as economical solution for these parts.

10. Special Machines

W. F. & John Barnes Co.—4-page illustrated bulletin No. 2 discusses design method of company which facilitates coordinated design of special machine tools for drilling, tapping, boring, milling or honing of parts on production basis. Method of design and building machines for special services are covered.

11. Plastics

Bakelite Corp.—16-page illustrated bulletin No. F-5415 is entitled, "Technique of Molding Bakelite Low Loss Phenolic." Primary considerations of mold design, mold charge, mold operation and rectifying unsatisfactory moldings are discussed in detail.

12. Pipe Specifications

Babcock & Wilcox Tube Co.—Technical data card No. 107-B contains list of standard specifications for seamless and welded tubes and pipes. A.S.T.M., A.S.M.E. and other specifications are given, together with materials, maximum and minimum sizes.

13. Grate Flooring

Walter Bates Co.—16-page illustrated catalog No. 43-44 is on "Bates Grates" for open steel flooring and stair tread applications. Grates are constructed of fillet welded hexagon cross bars for safety, strength and cleanliness. Engineering data includes load capacities, permissible floor deflections and specifications.

14. Acid Filters

R. P. Adams Co.—4-page illustrated bulletin No. 302 is descriptive of type CFR and CFL acid filters which are designed for clarification of industrial acids and corrosive liquids. Field embraces removal of solids from liquids where reclamation of cake is not essential. Important points of cleaning, installation and operation of these filters are outlined.

15. Ammonia

Armour Ammonia Works—16-page illustrated bulletin, "Method of Handling Cylinder Anhydrous Ammonia," is intended for heat treaters. Data includes properties of liquid and gaseous ammonia at various temperatures, sizes of bottle and tube type containers as well as Safety First measures.

16. Abrasive Points

Abrasive Co.—4-page illustrated folder covers abrasive points with demountable spindles. These "Victory Points" consist of threaded porcelain bushing inserted in and fused to abrasive wheel mass at high heats of kiln temperatures during vitrification process. They are supplied in ¼-inch diameter spindle sizes in standard A and W shapes.

17. Rivet Injector

Cleveland Pneumatic Tool Co.—19-page illustrated bulletin No. 89 describes part played by "Cleco Riv-N-Jectors" in solving rivet salvage problem. This light device has magazine with capacity of approximately 50 rivets, means of releasing rivets one at time and arrangement by which injector can be opened up for reloading. Use of this tool prevents rivets from falling on floor or into fixture assembly.

18. Floats

Chicago Float Works—20-page illustrated bulletin, "Floats," shows design and construction of seamless copper, stainless steel, aluminum, Monel, nickel and brass floats which are available in wide variety of sizes and shapes. Useful data are included for applications of floats to all types of liquid level controlling and indicating requirements. Standard and special designs are available.

19. Aluminum Bronze

Ampco Metals, Inc.—Three illustrated engineering data sheets Nos. 112-118, 114 and 115 discuss bronze alloys, particularly of aluminum bronze class. First bulletin describes company's facilities and general line of products. Second concerns use of bronze alloy for production of non-scratching feed fingers for screw machines. Third explains forging of "Ampco" metal to improve physical characteristics.

STEEL *Readers' Service Dept.*

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20. Power Bits & Hand Drivers

Apex Machine & Tool Co.—8-page illustrated catalog No. 17 is descriptive of power bits and hand drivers for clutch head type A screws. Specifications and prices are listed for various types. Company's service for reconditioning worn tools is outlined.

21. Parts Washing Machine

American Foundry Equipment Co.—4-page illustrated bulletin No. 19 describes "Tabl-Spray" washing machine for cleaning metal parts. Equipment is constructed so that sprays cover work from all sides and under varying angles. Operation of machine is outlined and specifications are listed. Other models of cleaning equipment are also shown.

22. Metal Cleaning Compound

American Chemical Paint Co.—4-page illustrated technical service data sheet No. P-100-S is descriptive of "Deoxidine No. 170." This phosphoric acid cleaner is especially adapted to deoxidizing steel artillery shell cases or to prepare other steel and aluminum ordnance parts for varnish and paint finishes. Chemical removes light oil, annealing scale and oxidizates rust and rusters.

23. Electric Welder

Allis-Chalmers—4-page illustrated folder covers the "Ampac 200" alternating current welder. Chart compares this model with four leading types of transformer welders on basis of eleven features. Electrical specifications are outlined. Wheel kit and accessory kit are available for use with this unit.

24. Template Dies

Algoma Products—4-page illustrated bulletin No. T-43 explains process of manufacturing blank and pierce template dies. This method produces dies in one-fourth time and one-third cost without special die design. Dies are interchangeable, easily altered for design changes, self-stripping and self-ejecting. They are available for either single, compound or progressive operations.

25. Carbide Tools

Carboloy Co.—12-page illustrated booklet No. GT-151 explains purpose of and method of securing "Carboloy" training films in 35-millimeter size which cover fundamentals of carbide tool manufacture, design application and maintenance. Outlines are given for each of six films. Also available for distribution to audience are film reference booklets covering each subject in detail.

26. Washroom Equipment

Bradley Washfountain Co.—16-page illustrated catalog No. 4308 contains complete information on new "Washfountains," "Multi-Stall" showers and drinking fountains which have been redesigned to save vital materials. Specification data and washroom planning suggestions are included. Advantages of improved sanitation with definite reductions in maintenance and installation costs are explained.

27. Masonry Saws

Clipper Mfg. Co.—Two illustrated bulletins describe "Clipper" masonry saw and abrasive cut-off blades. Masonry saw is available in four sizes and may be used for sizing firebrick, glazed tile, concrete products or brick. Typical cuts are shown by separate illustrations. Blades are made in 24 different fixtures for cut-off operations on all types of masonry materials.

28. Induction Motors

Century Electric Co.—16-page illustrated bulletin No. 344A gives specifications and application data on line of squirrel cage polyphase induction motors which are available in sizes from ½ to 600 horsepower. Motors are made in general purpose, splashproof, totally enclosed fan cooled, explosionproof and enclosed types.

29. Fasteners

Camloc Fastener Corp.—8-page illustrated bulletin, "Camloc High-Speed Fasteners," is descriptive of 4002 series in ¾-inch size and 2500 series in ⅞-inch size. First is composed of stud assembly, grommet and cam collar, latter being made in floating, straight, corner and ear styles for riveting. In second series cam collar is flanged directly to removable panel.

30. Welding Positioners

Cullen-Friestedt Co.—16-page illustrated bulletin No. WP-22 shows design, construction and operating advantages of "C-F" positioners for all types of welding applications. Use of equipment for various welding operations is shown. Positioners are available to capacities ranging from 1200 to 14,000 pounds and any position of weldment is obtained through push button control.

31. Bending Rolls

Buffalo Forge Co.—20-page illustrated bulletin No. 852-A deals with bending rolls for circle, segment and spiral bending of angles, tees, channels, flats, tubes, pipes, squares, rounds and special metal shapes. Vertical bending rolls, horizontal bending rolls, pinch-type benders, and shaping and wrapping rolls are described. Typical work is shown.

32. Motors & Generators

Crocker-Wheeler Electric Mfg. Co.—Four illustrated data sheets cover motors and generators. Form SCF-1 describes squirrel cage motors in capacities from ½ to 75 horsepower. Form SCF-2 covers ¾ to 7½ horsepower direct current motors. Form SCF-102 is descriptive of marine installations of shipboard motors. Shipboard auxiliary generators with turbine drives are described in form SCF-101.

33. Wire Rope Clamps

National Production Co.—12-page illustrated broadside describes "Safe-Line" wire rope clamps which are available in stock sizes for wire rope ranging from ⅛ to ¾ inch. These forged clamps are claimed to produce joints which are stronger than rope itself.

34. Water Softener

Cochrane Corp.—16-page illustrated bulletin No. 4021 is on "Carbite" softeners which are of carbonaceous zeolite type. Use of this equipment for treatment of boiler feedwater supplies is covered. Also described are chemical reactions, arrangement of equipment, results to be achieved, application to different water supplies and other pertinent data.

35. Shop Tools

Anderson Bros. Mfg. Co.—Two illustrated folders on "Shop Tools" contain brief descriptions and specifications of "Roto Checker" for testing shafting, model HP-100 hydraulic hand press, hand scrapers, power scrapers, standard and pillow block balancing ways, and scraper spotters.

36. Stainless Coils

Alloy Mfg. Co.—Illustrated folder, "for Airplane Manufacturers," explains facilities of company for producing pipe bends and coils of stainless steels. Typical work fabricated for aircraft assemblies are shown. Company is equipped to fabricate all sizes and shapes of pipe coils and bends.

37. Hand Stoning

Behr-Manning Corp.—12-page illustrated bulletin for users of metal cutting tools is entitled, "Hand Stoned Cutting Tools." Text discusses such subjects as what an edge is; why tools with incorrect edges break down; how refined, oil-stoned edges cut faster, better and hold up for longer time. Studies of production increases obtained from oil stoned tools are cited.

38. Metal Fabrication

All-Steel-Equip Co.—16-page illustrated booklet, "When You Need Help," outlines production facilities of company in all types of metal working operations. Engineering, tool and die making, shearing, forming, stamping, drawing, perforating, welding, plating, painting, enameling, riveting, assembling and other departments are described.

39. Welding Equipment

Victor Equipment Co.—64-page illustrated catalog, "Pressure Accurate," describes and gives specifications of pressure regulators, filters and safety valves, gages, cutting torches, cutting tips, welding torches, welding nozzles, heating torches, welding and cutting units, manifold systems and hose fittings for all types of gas welding and cutting applications. List prices are included.

40. V-Belts

Manheim Mfg. & Belting Co.—Illustrated catalog, in Spanish or English editions, covers "Veelos" link construction belts for V-drives. Correct method of measuring belt lengths, how to couple and uncouple links and information on installation are described. Extensive tabular matter shows horsepower ratings at various belt speeds and actual lengths of "Veelos" belts required when replacing endless V-belts.

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DON'T allow RUST to upset war production schedules in *your* plant, eat into your profits, and delay important deliveries. Use METALENE RUST PREVENTIVE to protect steel plates, rods, cold rolled strip, bars, sheets, and machined parts while in storage or in process of production.

METALENE RUST PREVENTIVE is a light bodied, non-viscous, free-flowing protective coating prepared from a hydroscopic base, allowing a maximum degree of moisture absorption. Easily applied by dipping, swabbing, spraying, or by the roll applicator method. METALENE RUST PREVENTIVE possesses greater coverage per gallon . . . which allows for a definite saving for each square foot of area requiring protection. METALENE RUST PREVENTIVE deposits a thin tenacious protective film, effective over a long period of time—yet easily removed when desired, by such petroleum solvents as AMFCO SPIRITS, naphtha, kerosene, or by an alkaline bath made with *AMFCO METAL CLEANER.

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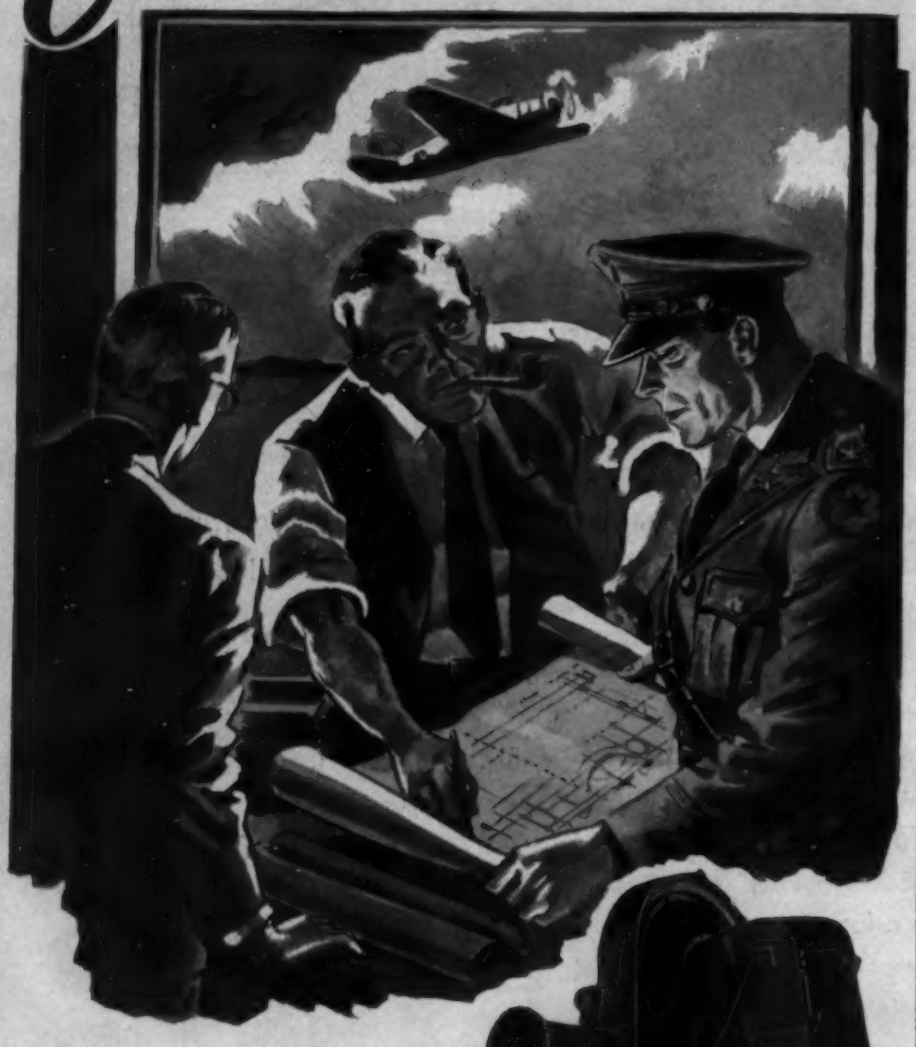
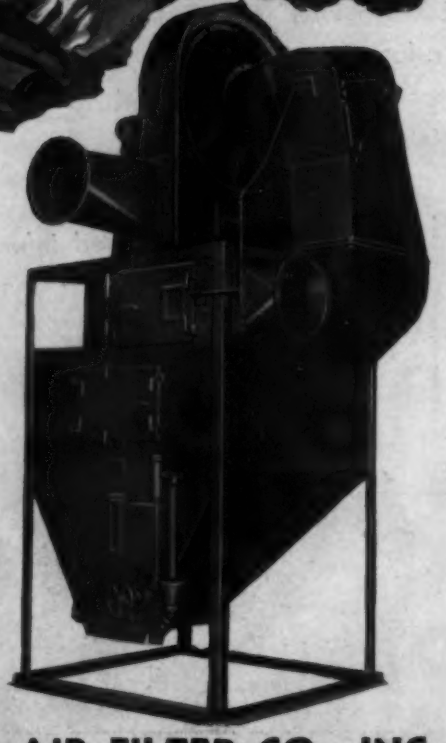


● Until the advent of war with its rigid demands for increased production, the control of industrial dusts was considered desirable, but not vital. However, War changed many things and *Dust Engineering* soon assumed its rightful place as an essential part of *production planning.*

The importance of *Dust Engineering*—protecting materials in process, reducing rejects, increasing worker efficiency and reducing maintenance costs—is fully attested by the fact that we continue to deliver more dust control equipment each year.

If you have a troublesome or dangerous dust condition, write us about your problem. Send for "AAF In Industry," a new booklet describing the complete line of AAF equipment.



At right—The Type W Roto-Clone, wet type dynamic dust precipitator widely used in steel mills throughout the nation.

AMERICAN AAF AIR FILTERS

AMERICAN AIR FILTER CO., INC.

INCORPORATED

443 CENTRAL AVENUE LOUISVILLE, KENTUCKY

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from the reservoirs "L" is fed to the burners by a motor-driven screw feed attached to each burner. These motors are but a fraction of a horsepower each and are not shown on the drawing.

Orifice plates with pressure taps are installed in the air lines supplying bustle pipes "F", "G" and "H". As the air supply is varied by the action of the Rayotube, the differential across the orifice in each respective air supply line varies and furnishes an impulse from which the speed of the motors, driving the pulverized coke feed to the burners, is varied. This is the conventional method of combustion control, i.e. control of air flow from temperature, and proportional control of fuel from air flow.

Control of kiln burner "E" is identical to that for the melting furnace with the exception that the impulses are received from Rayotube "N" installed in the kiln hood. As the fuel to the melting furnace is decreased, the temperature in the kiln hood drops and the fuel input through burner "E" is increased, indirectly, through impulses received from Rayotube "N".

While this description pertains to pulverized coal fuel, oil or gas fuel may be employed with satisfactory results.

To provide for any contingency which may result in the metal bath chilling to a point lower than that required for reactions between the slag and metal, three electrodes are installed in pockets formed in the sidewalls of the furnace below metal line, 120 degrees apart.

Tubes Located in Sidewall

In order to provide for carbon additions to the metal, refractory tubes are placed in pockets in the sidewall of the furnace 30 degrees apart in the same manner as the electrodes. Three of these pockets are used for electrodes as previously outlined, and hence, the refractory tubes are omitted from them. Pulverized coal, coke, or charcoal is injected through the refractory tubes by air at 15 pounds pressure.

In addition to the foregoing, another coal pulverizer is installed for supplying the crushed coal to the material at the sintering zone of the reduction kiln.

The plant will have a capacity of 400 net tons of pig steel per day.

The operation of this plant on vanadium-bearing ore, will produce as a coproduct 24 pounds of vanadium oxide per ton of pig steel produced. This product is obtained as follows:

The vanadium in the ore is reduced into the hot metal. As the metal is tapped into the ladle, mill scale or Fe_2O_3 is added to the metal. The oxygen in the Fe_2O_3 reacts with the vanadium in the metal, forming vanadium oxide or V_2O_3. The 24 pounds of vanadium oxide thus formed may be further reduced to give 13 pounds of vanadium.

Any silicon or manganese contained in the metal will also be oxidized along with the vanadium. However, the metal will contain a certain amount of these

elements as well as vanadium as residual; the approximate analysis of the metal after treatment will be:

Element	Per cent
C	0.3 to 2.00
Mn	0.08
P	0.006
S	trace
Si	0.04
V	0.08

A metal charging stock of the foregoing approximate analysis is invaluable to steel producers, especially to operators of acid open hearths, electric induction and electric arc furnaces where little or no refining is done and where practice consists of making additions to meet specifications. This applies in particular to stainless steels, tool steels and steel specialties. The charging stock is particularly valuable in the production of steels of low-phosphorus content. The Adirondack region is not the only vicinity where this operation may be utilized. Substantial deposits of vanadium-bearing titaniferous ore are found in Iron Mountain, Wyo. and it is probable that a similar operation may be applied to this ore, producing vanadium in conjunction with iron or steel charging stock.

With the abundance of vanadium-bearing ore, from which more than enough vanadium for the steel industry may be produced, as a by-product of metallic charging stock, it appears that the dire shortage of this metal throughout the world need not exist, and that the importation of vanadium from foreign countries is unwarranted. It also appears that the practice of charging this ore in blast furnaces in quantities too low to justify its recovery, is a waste of the natural resources of the country, and should be abandoned in favor of smelting vanadium-bearing ore by the direct reduction method.

New Cutting Tools Save Steel, Have Longer Life

Three to ten times longer life and a 50 per cent saving in scarce high-speed tool steel are achieved by an entirely new type cutting tool developed by Triangle Tool Co., Cleveland. The cutters feature triangular-shaped bits which are held firm and rigid by a triangular seat in the tool holder—eliminating vibration and tool chatter. The bits are chromium plated by the Lundbye process for longer life.

In addition to conserving critical materials, the new triangular design permits both large and small tool bits to be used in the same holder without special shims or wedges. Each bit performs three basic cutting operations. Right or left hand cutting is performed with the same bit without additional grinding. The same cutter, turned end-for-end, requires no extra adjustment for performance of square cutting operations.

A *war-time lesson* in
FAST, SMOOTH FINISHING

With
3-M ABRASIVE BELTS
and Segment Face Contact Wheels

An important lesson driven home by wartime demands for speed and for conservation of man-power and materials is that grinding and finishing need not be a "bottleneck." Weld flashings, tool marks and other imperfections can be removed cleanly, smoothly, with "production line" speed and precision, by a Backstand Idler equipped with a 3-M ABRASIVE BELT and Segment Face Contact Wheel. These tough, fast-cutting belts and cushioned center wheels finish rounded surfaces, corners, edges . . . irregular shapes of every description . . . quickly and accurately. The grinding is done only where grinding is needed, without wasted time or lost motion. More complete information on this practical proven finishing short cut is contained in our 3-M METHODS booklet. Use the coupon below to request your FREE copy.

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BUY MORE WAR BONDS

FORGING COMES *FIRST*

FORGING comes first in the production of any metal part requiring strength with toughness and minimum weight. This is true in times of peace, but much more so in times of war, when metals, like humans, must stand up under unpredictable loads. ● Before the great machine tools can turn out the highly finished, microscopically accurate crankshafts, connecting rods, valves, gears, axles, airplane parts, tank parts, gun parts and the thousands of other parts vital to mechanized warfare, the hot metal must secure its great strength and toughness and its close-to-finish shape under the impact of the drop hammer. ● For over 45 years, Chambersburg Hammers, in war and in peace, have been helping industry do this job.

CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.

ARMY E NAVY

CHAMBERSBURG

HAMMERS · CECOSTAMPS · PRESSES

WPB Assuming Closer Control of Distribution

Will specify tonnage for cancellation gaps. . . Ships take 57 per cent of plates with no easing in prospect. . . Heavy navy pontoon program presses for sheet deliveries

DEMAND
Covers production for months.

PRODUCTION
Continues at 98½ per cent.

PRICES
Steady.

CLOSER control of steelmaking is being assumed by the War Production Board, which has required mills to report gaps in rolling schedules resulting from cancellations and deferments and WPB will fill the open capacity by assigning tonnage, instead of mills making the revision.

Fewer deferments and cancellations are appearing and revised schedules are subjected to less adjustment. Some bar tonnage has been reinstated but 10,000 tons of plates for a shipyard have been removed from one mill schedule. Railroads are getting more steel, including shapes, plates and sheets. An upturn in shapes has filled October schedules for some mills. Some producers have closed on plates for January, with Maritime Commission requirements for November yet to come. Ships account for approximately 57 per cent of plates now being rolled and demand in other directions for miscellaneous fabrication is expanding.

Overall bookings with most producers in August are slightly below July, although there are exceptions. Many consumers have ordered ahead to the limit of their allotments under CMP regulations and some fourth quarter allotments are yet to come through. Holders of late certificates have difficulty placing orders for fourth quarter delivery on sheets and carbon and alloy bars, although hot-rolled alloy bars are available in November. This easy situation in the latter, in contrast to other bars, is partly due to increased capacity, specification changes to high carbon, manganese and bessemer grades and resulting decline in demand.

• • •

Easing in the steel plate situation is precluded by the heavy 1944 shipbuilding program and other important requirements. Much plate tonnage remains to be placed for the domestic freight car program and a large Navy tonnage is to be allotted for various ships, including aircraft carriers. Bookings are practically solid into January and impending Maritime Commission allotments indicate early covering of first quarter production.

Cancellations and deferments of sheet bookings have made possible improvement in cold-rolled sheet deliveries. Producers sold well into March have been able to move tonnage forward to January and February and urgent orders have been placed in fourth quarter schedules. Revision has also improved some hot-rolled delivery promises. Mills closely tied in with heavy fixed programs, such as landing mats and drums, are in tight position. Navy pontoons, said to number 144,000 units, each requiring one ton of steel, are also pressing for early deliveries. Late allotments for important requirements, largely in lighter gages, are being fitted into schedules with difficulty. Additional allotments are under consideration.

Steel production last week remained at 98½ per cent, although tonnage increased considerably. This was due to the fact that computations were made on the basis of enlarged capacity announced by the American Iron and Steel Institute. Principal changes were at Pittsburgh and Wheeling, the former dropping 1½ points to 98½ per cent as the result of increased capacity, while Wheeling advanced 8 points to 103 per cent when a plant was removed from potential capacity for steelmaking, narrowing the base. Chicago advanced ½-point to 99 per cent and Cleveland ½-point to 94½ per cent. Cincinnati declined 5 points to 92 and Detroit 3 points to 83. Rates were unchanged as follows: St. Louis, 89; New England, 97; Youngstown, 98; Birmingham, 95; eastern Pennsylvania, 59; Buffalo, 90½.

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Trend toward electrolytic tin plate continues and while production this year has been concentrated largely into second half it probably will be four times as great as last year and is estimated at about 400,000 tons. Some authorities believe production of hot-dipped tin plate next year will not be greater than 350,000 tons, about 10 to 15 per cent of normal plate production.

Bolt and nut demand is heavy and distribution of carbon bars for their manufacture is improved under CMP. Shipbuilding requires large quantities and a New England shipyard is placing orders for 30,000,000 pieces. An ammunition depot in the East requires 250 tons, placed in the Pittsburgh district.

Wire mills find a large portion of their bookings are of material requiring long processing, three to eight weeks, and deliveries on bright basic wire have lengthened to eight weeks by mills recently quoting four to six weeks. Aircraft builders are pressing heavily for valve spring wire, orders for which are large.

Average composite prices of steel and iron products continue unchanged at levels of the past several months, holding to ceilings prescribed by Office of Price Administration. Finished steel composite is $56.73, semifinished steel $36, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Aug. 28	Aug. 21	Aug. 14	One Month Ago July 1943	Three Months Ago May, 1943	One Year Ago Aug., 1942	Five Years Ago Aug., 1938
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$58.00
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	36.60
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	19.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	14.55

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material	Aug. 28, 1943	July, 1943	May, 1943	Aug., 1942
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.48	2.49
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.22	2.22	2.22
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55
Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to $\frac{5}{16}$-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron	Aug. 28, 1943	July, 1943	May, 1943	Aug., 1942
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.19
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.34	25.34	25.36	25.39
No. 2 fdry., del. Pitts., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.30	24.30	24.30	24.06
No. 2 fdry., del. Phila.	25.84	25.89	25.89	25.89
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.34	31.39	31.54	31.54
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.46	140.65
Scrap				
Heavy melting steel, Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2. E. Pa.	18.75	18.75	18.75	18.75
Heavy melting, steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke				
Connellsville, furnace, ovens	$6.50	$6.50	$6.40	$6.00
Connellsville, foundry, ovens	7.75	7.75	7.50	7.25
Chicago, by-product fdry., del.	12.25	12.25	12.25	12.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill. Kaiser Co. Inc. $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncropped, $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36; Duluth (bil.) $36.
(Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co. $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40. Detroit, del. $42; Duluth, billets only, $42.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O.

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section: 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over, $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, Galveston, No. 5—9/32 in., inclusive, per 100 lbs., $2. Do., over 9/32—47/64-in., incl., $2.15.
Worcester add $0.10; Pacific Ports $0.50.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Mahoning Valley 2.22½c; Detroit, del. 2.25c; Eastern Mich. 2.30c; New York del. 2.49c; Phila. del. 2.47c; Gulf Ports, dock 2.52c; Pac. ports, dock 2.80c. (Calumet Steel Division, Borg Warner Corp., may quote 2.35c, Chicago base, on bars produced in its 8-inch mill.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.35c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.55
		(.20-.30 Mo)	0.60
2300	1.70	4340	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.70	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70c; Toledo 2.80c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City. New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit del. 3.45c; Eastern Mich 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.35c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.20c; Eastern Mich. 2.25c; Phila. del. 2.27c; New York del., 2.34c; Pacific ports 2.65c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c; Phila. del. 3.67c; Pacific ports 4.05c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific Ports 4.25c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage, base 2.75c; Granite City, base 2.85c; Detroit del. 2.85c; Eastern Mich. 2.90c; Pacific ports 3.40c.
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Detroit del. 3.45c; Eastern Mich. 3.50c; Pacific ports 4.00c.

Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	....
65	7.15c	7.90c	....
58	7.65c	8.40c	....
52	8.45c	9.20c	....
U.S.S., R.C. Grade 10.10c		.....	....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c;. Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.45c; Eastern Mich. 3.50c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65.

Tin Mill Black Plate, Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.29c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.45c.
(Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. 2.20c, f.o.b. basing points.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 3.80c

Shapes

Structural shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.27c; Phila., del., 2.215c; Pacific ports, 2.75c.
(Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth):

Bright basic, bessemer wire	2.60c
Spring wire	3.20c

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.55; Pacific ports	3.05c
Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland	3.05c
Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland	3.40c
Woven fence, 15½ gage and heavier, per base column	.67
Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.	

Pipe, Tubes

Welded Pipe: Base price in carloads, threaded and coupled, to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

	Butt Weld, Steel		Butt Weld, Iron	
In.	Blk.	Galv.	Blk.	Galv.
⅛	56	33	24	3½
¼ & ⅜	59	40½	30	10
½	63½	51	34	16
¾	66½	55	38	18½
1-3	68½	57½	37½	18

	Lap Weld, Steel		Lap Weld, Iron	
In.	Blk.	Galv.	Blk.	Galv.
2	61	49½	23	3½
2½-3	64	52½	28½	10
3½-6	66	54½	30½	12
7-8	65	52½	31½	14½
9-10	64½	52	33½	18
11-12	63½	51	32½	17
			28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O. D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	....	....
1¼"	13	9.26	10.67	....	....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.03	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.
Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.
*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.
Supplies: Track bolts, 4.75c; do. heat treated, 5.00c. Tie plates, $43 gross ton, base.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base. per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	....	....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	....	§§18.00	19.00	....	....

*With 2-3% moly. †With titanium. ‡With columbium. ** Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices; wasters 75%, waste-wasters 65%, except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

⅛ x 6 and smaller	65½ off
Do., ¼ and ⅜ x 6-in. and shorter	63½ off
Do., ½ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex.	U.S.S	S.A.E.
⅜-inch and less	62	64
½-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅜-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*6.50
Connellsville, foundry	7.50- 8.00
Connellsville prem. fdry.	7.75- 8.10
New River, foundry	8.50- 8.75
Wise county, foundry	7.25- 7.75
Wise county, furnace	6.75- 7.25

By-Product Foundry

Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	†12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

*Operators of hand-drawn ovens using trucked coal may charge $7.00, effective Feb. 3, 1943. †$12.75 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do. tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	No. 2 Foundry	Basic*	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.53	26.03	27.53	27.03
Brooklyn, N. Y., del.	27.50	.....	.....	28.00
Birdsboro, Pa., base	25.00	24.50	26.00	25.50
Birmingham, base	‡20.38	†19.00	.....	.....
Baltimore, del.	25.61	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	24.22	.....	.....	.....
Cincinnati, del.	24.06	22.68	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.15	.....	.....	.....
Philadelphia, del	25.46	24.58	.....	.....
St. Louis, del.	24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.10	24.60	25.60	25.10
Muskegon, Mich., del.	27.19	.....	.....	27.19
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.39	24.89	25.89	25.39
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.31	25.81	26.81	26.31
Duluth, base	24.50	24.00	25.00	24.50
St. Paul, del.	26.63	26.13	27.13	26.63
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston, del.	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.44	24.61	.....	25.11
Neville Island, Pa., base	24.00	23.50	24.50	24.00
‡Pittsburgh, del. No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	21.50	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.....	.....
Baltimore, del.	25.99	.....	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.84	25.34	.....	26.34
Toledo, O., base	24.00	25.50	24.50	24.00
Mansfield, O., del.	25.94	25.44	25.44	25.94
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%; 50c deduction under 1.75%. †For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese over 1.00%.

High Silicon, Silvery

6.00-6.50 per cent (base)	$29.50		
6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn. $28.00
Chicago, del. 31.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn. $28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn. 33.00

Gray Forge

Neville Island, Pa. $23.50
Valley, base 23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.74, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $2 per ton, effective May 20, 1943. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky. $84.60

First Quality

Pa., Ill., Md., Mo., Ky. 51.30
Alabama, Georgia 51.30
New Jersey 56.00
Ohio 43.00

Second Quality

Pa., Ill., Md., Mo., Ky. 46.55
Alabama, Georgia 38.00
New Jersey 49.00
Ohio 36.00

Malleable Bung Brick

All bases $59.85

Silica Brick

Pennsylvania $51.30
Joliet, E. Chicago 58.90
Birmingham, Ala. 51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press $31.00
Wire cut 29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk 22.00
net ton, bags 26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick $54.00
Chem. bonded chrome 54.00
Magnesite brick 76.00
Chem. bonded magnesite 65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net ton, carloads, CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60% $30. (After Aug. 29 base price any grade $30.)

Ferroalloy Prices

Ferromanganese (standard): 78-82% c.l. gross ton, duty paid, eastern, central and western zones, $135; add $6 for packed c.l., $10 for ton, $10.50 less-ton; f.o.b. cars, New Orleans, $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33. Ferromanganese (low and medium carbon): eastern zone, low carbon, bulk, c.l., 23c, 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c, 2000 lb. to c.l., 24.40c; medium, 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21%, carlots per gross ton, Palmerton, Pa. $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, bulk, c.l., 79.50c, 2000 lb. to c.l., 80c; central, 81c and 82.50c; western, 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c —low carbon, eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65c for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. to c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr.

Briquets: Ferrochrome, containing exactly 2-lb. Cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 to c.l., 8.75c; silicomanganese briquets, containing exactly 2 lb. manganese and ¼ lb. silicon, bulk, c.l., 5.80c, 2000 lb. to c.l., 6.30c; ferrosilicon briquets, approximately 5 lb. and containing exactly 2 lb. of silicon, or weighing approximately 2¼ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, ferrochrome, .3c for c.l. and .5c for 2000 lb. to c.l.; silicomanganese, add .25c for c.l., and 1c for 2000 lb. to c.l.; ferrosilicon, add .15c for c.l. and .40c for 2000 lb. to c.l.; western, ferrochrome, add .70c for c.l. and 2c for 2000 to c.l.; silicomanganese, add .55c for c.l. and 2c for 2000 lb. to c.l., ferrosilicon, add .30c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk, c.l., 6.65c and 2000 lb. to c.l., 7.85c; central, 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% and max. 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 97% and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicomanganese: Max. 1.50 carbon, bulk, c.l., eastern zone, 6.05c, 2000 lb. to c.l., 6.70c; central, add .25c and 1.00c; western, .35c and 2.00c; f.o.b. shipping point, freight allowed; all prices per pound of alloy.

Manganese Metal: 96 to 98% manganese, max. 2% iron, eastern zone, bulk, c.l., 39.60c, 2000 lb. to c.l., 40c; central, 39.85c and 41c; western, 40.15c and 43.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 35.60, 2000 c.l., 36c; central, 35.85c and 37c; western, 36.15c and 39.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99%, per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium: ton lots $1.23; less-ton lots $1.25. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.39; less-ton lots $1.40. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20%, contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Ferrovanadium: 35-40%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

Zirconium Alloy: 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼-cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c. Spot ½-cent higher.

Simanal: (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 9.50c; ton lots 10.00c, less ton lots, 10.50c.

Boreal: 3 to 4% boron, 40 to 45% si., $7 lb. cont. Bo., f.o.b. Philo, O.

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Coldrolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.144[11]	4.715	7.762[23]	6.062[23]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.103[11]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.103[11]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[16]	4.872[23]	4.072[11]	4.772	7.566[23]	5.866[23]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[23]	4.052[11]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[23]	4.041[11]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[23]	4.165[11]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.65[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[13]	4.40[14]	3.75[23]	4.66	7.35[23]	5.65[23]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.81[1]	4.65[13]	4.30[14]	3.65[23]	4.35	7.35[23]	5.65[23]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[13]	4.40[24]	3.75[11]	.....	7.45[23]	5.75[23]
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[13]	4.30[24]	3.65[11]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[13]	4.40[24]	3.75[11]	4.45	7.556[23]	5.856[23]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.	4.30[24]	3.65[11]	4.35[11]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[13]	4.500[24]	3.800[11]	4.659	7.680[23]	5.980[23]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[16]	5.443[24]	4.443[11]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[16]	..	..	.....	.....	.....
Cincinnati	3.611[1]	3.691[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[16]	4.475[24]	4.011[11]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[13]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[16]	..	..	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[13]	4.20[24]	3.75[23]	4.65	5.75[23]	5.85[23]
Chicago (country)	3.40[1]	3.45[1]	3.45[1]	5.05[1]	3.15[1]	3.50[1]	3.50[1]	4.85[13]	4.10[24]	3.65[11]	4.55	5.75[23]	5.85[23]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[13]	4.337[24]	3.887[11]	4.787	5.987[23]	6.087[23]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[13]	4.568[24]	3.98[11]	4.78	6.08[23]	6.18[23]
St. Paul	3.76[2]	3.81[2]	3.81[2]	5.41[2]	3.51[2]	3.86[2]	3.86[2]	5.257[13]	4.46[24]	4.361[11]	5.102	6.09[23]	6.19[23]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[1]	5.172[13]	4.347[24]	4.031[11]	4.931	6.131[23]	6.231[23]
Memphis, Tenn.	3.90[5]	3.95[5]	3.95[5]	5.71[5]	3.85[5]	4.10[5]	4.10[5]	5.25[13]	4.66[24]	4.31[11]	.....	.....	.....
Birmingham (city)	3.50[5]	3.55[5]	3.55[5]	5.83[5]	3.45[5]	3.70[5]	3.70[5]	4.75[13]	4.78[24]	4.43[11]	.....	.....	.....
Birmingham (country)	3.40[5]	3.45[5]	3.45[5]	5.83[5]	3.35[5]	3.60[5]	3.60[5]	4.75[13]	4.78[24]	4.43[11]	.....	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	3.95[4]	4.20[4]	4.20[4]	5.25[20]	4.95[19]	4.60[21]	5.00	.....	.....
New Orleans (country)	4.00[4]	3.80[4]	3.80[4]	5.75[4]	3.85[4]	4.10[4]	4.10[4]	5.15[20]	4.95[19]	4.60[21]	.....	.....	.....
Houston, Tex.	3.75[5]	4.25[5]	4.25[5]	5.50[5]	3.75[5]	4.30[5]	4.30[5]	5.25[20]	5.43[19]	4.30[23]	.....	.....	.....
Los Angeles	4.35[4]	4.60[4]	4.90[4]	7.15[4]	4.95[4]	4.90[4]	6.70[4]	5.95[13]	7.15[6]	5.70[23]	.....	9.55[23]	8.55[23]
San Francisco (city)	3.95[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	4.50[7]	6.60[13]	7.55[19]	5.55[23]	.....	9.80[5]	8.80[5]
San Francisco (country)	3.85[7]	4.25[7]	4.55[7]	6.25[7]	4.45[7]	4.40[7]	4.40[7]	6.50[13]	7.45[19]	5.45[23]	.....	.....	.....
Tacoma	4.20[8]	4.45[8]	4.75[8]	6.50[8]	4.65[8]	4.25[8]	5.45[8]	5.70[8]	6.65[24]	5.75[23]	.....	.....	.....
Seattle (city)	4.20[8]	4.45[8]	4.75[8]	6.50[8]	4.65[8]	4.35[8]	5.45[8]	5.70[8]	6.65[24]	5.75[23]	.....	.....	8.00[8]

*Basing point cities, with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in amendments Nos. 10 to 16 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 3999 pounds; [6]—300 to 1999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base.

Ores

Lake Superior Iron Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00c

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash. (S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal	
44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (seller's nearest rail)	
48% 3:1	52.80
less $7 freight allowance	

Manganese Ore

Including war risk but not duty, cents per gross-ton unit, dry, f.o.b. cars, New Orleans and Mobile; 5 cents higher at Norfolk, Baltimore, Philadelphia, New York; adjustments for analysis variations. (Based on OPA schedules.)

Brazilian, 48%	73.8c
Brazilian, 46%	71.8c
Caucasian, 51%	75.3c
Caucasian, 50%	74.8c
Chilean, 48%	73.8c
Indian, 50%	74.8c
Indian, 48%	73.8c
South African, 48%	73.8c
South African, 46%	71.8c
(Duty Free)	
Cuban, 51%	86.5c
Cuban, 48%	85.0c
Cuban, 45%	82.0c
Philippine, 50%	85.0c
Domestic, 48%, f.o.b. mines	100.0c

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Desig-nation	Chemical Composition Limits, Per Cent — Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Electric furnace Bars per 100 lb.	Billets per G T	Bars per 100 lb.	Billets per G T
NE 1330	.28-.33	1.60-1.90	.20-.35	.....	.....	.....	$ .10	$2.00	.....	.....
NE 8020	.18-.23	1.00-1.30	.20-.35	.....	.....	.10-.20	.45	9.00	$.95	$19.00
NE 8442	.40-.45	1.30-1.60	.20-.35	.....	.....	.30-.40	.90	18.00	1.40	28.00
NE 8615	.12-.17	.70- .90	.20-.35	.40-.60	.40-.70	.15-.25	.75	15.00	1.25	25.00
NE 8720	.18-.18	.70- .90	.20-.35	.40-.60	.40-.70	.20-.30	.80	16.00	1.30	26.00
NE 9255	.50-.60	.75-1.00	1.80-2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9262	.55-.65	.75-1.00	1.80-2.20	.20-.40	.....	.....	.65	13.00	.....	.....
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.85	17.00	1.35	27.00
NE 9537	.35-.40	1.20-1.50	.40-.60	.40-.60	.40-.70	.15-.25	1.20	24.00	1.70	34.00
NE 9630	.28-.33	1.20-1.50	.40-.60	.40-.60	.....	.....	.80	16.00	1.30	26.00
NE 9642	.40-.45	1.30-1.60	.40-.60	.40-.60	.....	.....	.85	17.00	1.35	27.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

					ELECTRIC FURNACE, ACID OPEN-HEARTH AND FOUNDRY GRADES									
					Low Phos. Grades		Heavy Structural, Plate			Foundry Steel		Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
	OPEN HEARTH GRADES*	Mixed Bor., Turn., Machine Turnings	Cast Iron Borings	Shoveling Turnings	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	3 ft. and less	2 ft. and less	1 ft. and less	2 ft. and less	1 ft. and less			
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$15.00	$16.00	$17.00	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Bethlehem	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Buffalo	19.25	14.25	15.25	16.25	24.25	21.75	20.75	21.25	21.75	20.75	21.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	14.50	15.50	16.50	24.50	22.00	21.00	21.50	22.00	21.00	21.50	17.50	19.00	20.50
Detroit	17.85	12.85	13.85	14.85	22.85	20.35	19.35	19.85	20.35	19.35	19.85	15.85	17.35	18.85
Toledo	†15.35	12.85	13.85	14.85	...	...	...	...	...	...	...	...	...	...
Chicago	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Kokomo	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Duluth	18.00	13.00	14.00	15.00	23.00	20.50	19.50	20.00	20.50	19.50	20.00	16.00	17.50	19.00
St. Louis	17.50	12.50	13.50	14.50	22.50	20.00	19.00	19.50	20.00	19.00	19.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	12.00	13.00	14.00	22.00	19.50	18.50	19.00	19.50	18.50	19.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	12.50	13.50	21.50	19.00	18.00	18.50	19.00	18.00	18.50	14.50	16.00	17.50
Seattle	14.50	9.50	10.50	11.50	19.50	17.00	16.00	16.50	17.00	16.00	16.50	12.50	14.00	15.50

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails 3 ft. and under	Scrap Rails 2 ft. and under	Scrap Rails 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	$21.00	$22.00	$23.50	$24.00	$24.25	$24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	15.50	16.50	17.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

*Open Hearth Grades refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. No. 1 chem. borings, 1 per cent oil, $1 under, No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bundles, $2 under No. 1 heavy melting; cast steel, $2.50 over, No. 2 busheling, $2.50 under No. 1 heavy melting steel, auto springs, crankshafts, $1 over No. 1 heavy melting. †Toledo open-hearth grades cover only No. 2 busheling.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati includes Newport, Ky. St. Louis basing point includes Granite City, East St. Louis and Madison, Ill. San Francisco includes South San Francisco, Niles and Oakland, Calif. Chicago includes Gary, Ind. Claymont, Del., includes Chester, Pa.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.65 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, if most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $3.50 less; (material from which Nos. 1, 2 and 3 bundles made is $4 less) than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grades of prepared scrap."

Remote Scrap: Consists of all grades, except railroad scrap, in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana, Utah, Arkansas, Nebraska, Kansas. Delivered price may exceed by not more than $7 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $7 the nearest basing point price. Colorado is remote for Colorado consumers only.

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½, refinery; dealers may add ¼c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 12.25c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 14.25c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, corroding or chemical, 6.40c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey, New York State, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less than 2000 lbs.

Secondary Aluminum: All grades 14.00c per lb. except as follows: Low-grade piston alloy (No. 122 type) 13.50c; No. 12 foundry alloy (No. 2 grade) 13.50c; chemical warfare service ingot (92½% plus) 13.50c; steel deoxidizers in notchbars, granulated or shot, Grade 1 (95-97½%) 13.75c, Grade 2 (92-95%) 13.50c, Grade 3 (90-92%) 13.00c, Grade 4 (85-90%) 12.50c; any other ingot containing over 1% iron, except PM 754 and hardeners, 13.50c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.) 20.50c lb.; add 1c for special shapes and sizes, including 3-lb. ingot and 12-lb. round ingot; incendiary bomb alloy 23.40c, 50-50 magnesium-aluminum 23.75c, ASTM B80-41T No. 11 25.00c, ASTM B94-40T No. 13 25.00c, all others 23.00c. Prices for 100 lbs. or more; for 25-100 lbs. add 10c; for less than 25 lbs. 20c; incendiary bomb alloy f.o.b. plant any quantity; carload freight rate allowed all others for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.75-99.79% incl. 51.62½c; Grade C, Cornish refined 51.62½c; Grade D, 99.0-99.74% incl. 51.12½c; Grade E, below 99%, 51.00c.

Antimony: American, bulk, carlots, f.o.b. Laredo, Tex., 99.0-99.8% grade 14.50c, 99.8% and over (arsenic 0.05% max.; no other impurity to exceed 0.1% 15.00c. Add ¼c for less-carlots to 10,000 lbs.; ½c for 9999-224 lbs.; 2c for 223 lbs. and less.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: Prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz. $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $15 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $2.11 lb.; 100 lbs. or more on contract, $1.50 lb.

Indium: 99.5%, $10 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $36 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A, B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.61c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 28.75c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c, Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.95c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Bare, soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlots 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat, mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameters 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.26c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.50c Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c. 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu; 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c, f.o.b. Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add %c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.900
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil., 5%	9.250	9.000	4.625
Phos. br., A. B. 5%	11.00	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Manz. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add %c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbitt-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 8.00c; Muntz metal condenser tubes 7.50c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.00c, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings, old zinc 7.25c f.ob. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c; add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 112

Cold-finished sheet deliveries have improved with most mills, by as much as two months with some units. Producers who were sold into March have moved considerable tonnage forward for January and February shipment and in addition will fill some more urgent orders for fourth quarter. Cancellations and deferments make this possible. Some hot-rolled deliveries are also improved by revised schedules. Mills closely tied to heavy fixed program requirements such as drums and landing mats are notably tight. Most of warehouse loads on galvanized will be delivered in October; demand is light except for this directive, with deliveries in December, but other finishes of carbon sheets are sold into January-February with most sellers.

Scattered late allotments for fourth quarter are appearing for important tonnages, notably in light gages, which are fitted into schedules with difficulty, although limited tonnage is open for December in some instances. On the whole, sheet buying for miscellaneous requirements is somewhat quiet, pending release of additional allotments, but the ratio of fixed tonnage required for several large programs continues to maintain the tight situation. A development in drum manufacture is the fabrication of a collapsible unit of synthetic rubber. The manufacturer of these drums is located in Lafayette, Ind.

Sheet demand is in excess of production directives of mills, probably a result of large programs for landing mats, said to involve 400,000 to 500,000 tons from December to May. The large Navy pontoon program, involving at least 144,000 units, each requiring about one ton of steel, consisting of 10-gage hot-rolled sheets for the hull and 3/16-inch floor plates for decks.

Narrow cold strip mills are sold up to production directives into February, producers having a six-month backlog in numerous cases, subject to revision in schedules for unforeseen developments. Elimination of revisions appears impossible, but scheduling is smoother under CMP, which is getting belated commendation. Backlogs include a relatively high ratio of high carbon, which requires annealing. While not all third quarter tonnage will be delivered at the end of the period, the delinquent volume will not be as heavy as it was at the end of previous quarters, before the advent of CMP. Deferments growing out of excess inventories are likely to be fewer in fourth quarter; inventories are getting into the 60-day balance and most of the larger ones will be within that circle during fourth quarter, which means less will be credited to share-the-steel total.

Machine gun belt links and other ordnance items require large tonnages of strip, notably .50 calibre and some 10-inch mills are taken up for the remainder of the year, largely on link steel. Delivery schedules on hot strip to cold-rolling mills are well maintained.

Bars . . .

Bar Prices, Page 112

Revived inquiry for alloy bars is for caterpillar treads, centered largely in locomotive shops, embarking on a heavy program for bulldozers and other heavy equipment. By December schedules range up to 1000 units a month with some shops, a development in demand revolving around production revisions, due to the progress on the battle fronts. Some shops on the new program were effected by the cutback in the tank program, the heavy equipment contracts supplementing larger locomotive requirements for the services.

Hot and cold-drawn bar deliveries are creeping further into first quarter; more mills are covered into February on hot and cold-rolled, while cold-drawn 11/16 to two-inch rounds are in March with one producer. Hot-rolled alloys are still available ahead of carbon stock, some mills having capacity for November shipment; cold-drawn and heat-treated material, due to processing, are extended into first quarter. For heavy die-lock chains, ball bearings and aircraft most fabricators are covered well in advance, bearing manufacturers especially, and new orders are slack. For shell steel there is a slight decline in scattered directions, but the overall demand and consumption of bars is heavy and maintained.

Screw machine requirements and bolt and nut specialty needs are substantial while shipyard demand for cold-rolled is heavy. While nonintegrated cold finishers have a few sizes open for December, most capacity is taken to the end of the year; directives on hot carbon bars to cold mills are near schedule and

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supplies are much better balanced than earlier in the year.

Plates . . .

Plate Prices, Page 113

Any easing in demand for plates is precluded by the 1944 shipbuilding program and expanding demand for other heavy requirements, pontoons, heavy mobile equipment and growing miscellaneous needs. Considerable tonnage remains to be placed with mills for the domestic freight car program; special-body railroad cars for lend-lease are for the most part covered. Also awaiting a place on mill schedules is a large navy tonnage for numerous ships, including carriers. Mills are booked into January and beyond on tonnage, exclusive of Maritime Commission allotments and indications are the first quarter will soon be filled.

Pipe. . .

Pipe Prices, Page 113

Demand for merchant steel pipe is slack in the New England area, shipbuilding and prefabricating shops accounting for most tonnage. Distributors are filling from stock orders with priorities as low as A-10 and most are seeking orders, with ample inventories.

Contrasting this situation in pipe, is the heavily sold position of tubing mills, notably on small sizes of cold seamless and electric welded for aircraft; deliveries on these are extended well into next year with most producers.

The accent now is on oil country goods in the tubular products market. Orders for drill pipe and casing are unexpectedly large. Sharp restrictions on production of these and other oil country specialties have resulted in field stocks being depleted. New drilling activity therefore is reflected directly in mill orders and thus far sufficient steel has not been allocated to provide enough tonnage to meet oil country needs. All producers of drill pipe and casing are asking increased allotments for this purpose.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 113

Bolt and nut demand is maintained at a high rate with shop backlogs heavy. For hexagon nuts requirements are so great deliveries are extended from 12 to 25 weeks, depending on size, which from ⅝-inch up are short. In bars, hexagons are the most extended, reflecting this demand; deliveries on carbon bars for bolts and nuts are more evenly balanced under CMP than before the operation of that plan for distribution, but shops are handicapped in improving deliveries, by labor shortages. Many are in competition with higher paying war industries, notably shipyards, and while supplies of carbon bars and bolt-size wire are near requirements, heavy demand and manpower precludes a normal improvement in deliveries.

Shipbuilding accounts for heavy tonnages of bolts and nuts, for while welding has reduced requirements for much fabrication, fastenings are needed for varied work, notably below deck. For the remainder of its Liberty ship program, a New England yard is placing 30,000,000 pieces; an outstanding construction project takes 250 tons for an ammunition depot in the East, placed with a Pittsburgh district mill.

Wire . . .

Wire Prices, Page 113

Volume of orders and backlogs with wire nails requiring fixed processing is high; must tonnage takes three to eight weeks for annealing and other finishing, arbitrarily limiting production in some departments. Except for the more common wire, most mills have filled production directives through the year and are booking some items into first quarter. Numerous specialties are in this category and bright basic wire deliveries have lengthened to eight weeks, with mills doing four to six until recently. Music wire production is up to quotas and some producers are pinched for rods, supply barely meeting demand. Rod inventories with non-integrated producers as a rule are somewhat heavier. Pressure for valve spring wire for aircraft requirements, is unabated and substantial new orders for rope wire for stranding have been placed. While mill schedules are still subject to revisions due to deferments, they are gradually being ironed out with less confusion and scattered tonnage is moved forward.

Tin Plate . . .

Tin Plate Prices, Page 113

Steel supply for the remainder of this year is pretty well balanced with projected production of tin plate. Some sources here believe the trend toward electrolytic plate will be continued and look for production of about 350,000 tons of dipped plate next year. If the overall picture on tin plate next year remains on about the same basis as it has

during 1943, this will mean only about 10 to 15 per cent of the total production will be dipped plate, with the remainder electrolytic and bonderized. Present tin plate schedules will be adequate to meet all packers' demands over the rest of this year. The primary problem confronting packers now is not one of sufficient material, but of sufficient manpower to get the food into the cans.

While electrolytic plate production this year is concentrated mainly in last half it probably will be four times as great as last year, with a total estimated at about 400,000 tons. This is less than was forecast at the beginning of the year. Delays in equipment deliveries and elimination of equipment "bugs" took more time than had been expected and some lag in research for use of the lighter coating contributed to the limitation.

Rails, Cars . . .

Track Material Prices, Page 113

Railroads are seeking to place their rail requirements for 1944 laying, which will be heavier than for 1943, as traffic has taken its toll of trackage. WPB approval will be necessary to assure delivery. As to steel for the freight car program, it is felt approval came too late for builders' requirements to be met this year. War Production Board is said to feel that builders have sufficient inventory to make a start on the program, with later shipments making it possible to complete the program.

Additional orders are being placed for freight cars, Chesapeake & Ohio, Nickel Plate and Pere Marquette recently distributing orders with several builders for 1525 units of various types.

Pig Iron . . .

Pig Iron Prices, Page 114

Until restrictions are relaxed further on production of certain types of industrial equipment, notably textile, paper mill and heating, gray iron foundries in New England will continue to require less pig iron. The slack resulting from decline in machine tool castings and completion of earlier miscellaneous war contracts has not been taken up despite efforts to obtain new business. A few individual shops have been partially successful, but demand for No. 2 foundry iron has leveled off.

Cast pipe foundries are on reduced schedules, also those normally supplying machine tool builders. The latter are nearing the end of backlogs, notably those building general-purpose tools, but are slated for more direct war material contracts which in most instances will not contribute much to foundries, according to experience thus far.

Demand for gray iron has declined sharply in many districts, as much as 40 per cent some instances, with sellers distributing more basic and with malleable requirements maintained. Reduction in requirements of cast iron pipe foundries has been drastic, especially in the East.

Considerable southern basic is moving to steelworks in eastern Pennsylvania, via Norfolk, Va., and this goes far toward filling the gap caused by decline in demand for No. 2 foundry from that source.

Scrap . . .

Scrap Prices, Page 116

An easy situation prevails in many scrap consuming centers, while in others supply is less than requirements. In general melters are taking all material offered from various sources but supply is light and in some localities reserves are being drawn on with little indication of larger receipts later in the year.

Except by means of allocations of remote scrap, entailing higher costs, consumers in the St. Louis area fear a severe shortage of scrap this fall. Most steelmakers are drawing on inventory and it is reported the largest supply is sufficient for only 30 days. Increased proportion of pig iron is planned by the leading interest in that district, which will add to costs. Yards have little material on hand and workers are scarce, one yard employing only 20 where 80 is the normal force.

All industrial material and most miscellaneous collections are moving into consumption in the Pittsburgh district. Demand is brisk, reflecting new buying on the part of major consumers. Blast furnace grades are in demand and will be taken in by any consumer. Some mills are fairly well loaded on heavy melting steel but most consuming points are still taking deliveries. Alloy scrap demand is dull, although high nickel material is moving well. Operators of crushing equipment report a lack of sufficient turnings to keep their machines busy, and it is understood that additional crushing capacity will shortly go into operation at Glassport, Pa.

Scrap supply is little more than hold-

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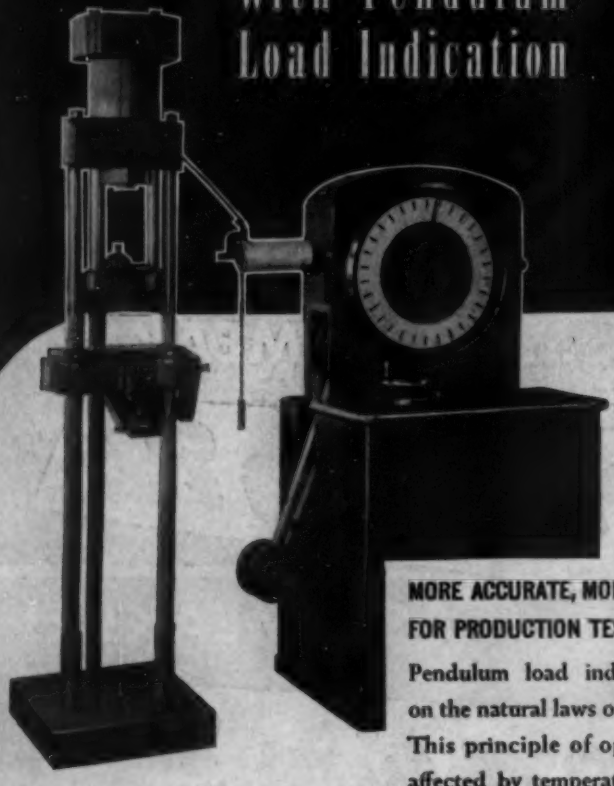

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ing its own in the Chicago district. Industrial material is providing most of current receipts, although here and there decline is noted as a result of war contract cancellations or reductions. Dealer scrap continues to decrease as yards receive less material and encounter growing manpower shortage. Railroad material is light and agricultural is merely a trickle. There is some doubt as to whether country scrap will improve after harvest because numerous instances are known of former collectors turning to other lines of work.

Canada . . .

Toronto, Ont.—Cancellation of contracts on some lines of war production has had a tendency to slow down new order placing in the Canadian steel markets and also has created a more wary attitude on the part of consumers who are unable to determine definitely their operating status for the future. A number of the larger war contractors already are heavily stocked with steel of various types, purchased months ago when British war contracts called for British specifications, and with the change to U. S. specifications this steel is of little use at this time. Indications are that large steel consumers now favor short term contracts, rather than large tonnage commitments when there is a possibility that they soon may run out of orders for their special line of production.

Most consumers are satisfied to hold new buying to the current year and while on some special lines orders extend into first quarter, 1944, most of the bookings are for delivery by Dec. 31. Despite changing conditions there has not been much improvement in supply for civilian use and these users still report difficulty in obtaining steel to take care of all requirements.

New interest is developing in sheets and there seems more readiness on the part of consumers to speculate in both black and galvanized sheets. As a result inquiries are appearing, not only for the remainder of the year, but some good tonnages are said to be pending for delivery well into first quarter. Canadian sheet supply is below actual requirements and steady imports are reported.

Practically no change has appeared in the plate situation. Demand is absorbing all production, and large tonnages still are required from the United States to meet increasing demands of shipbuilders. Plans are under way for further increase in Canadian shipbuilding operations and will be reflected in heavier demand for plates. Mills report no surplus capacity on plates for this year and bookings extend into 1944.

The scrap iron and steel markets continue in a somewhat precarious position as to future supply. Current receipts are below actual requirements and dealers' stocks are almost cleaned out, with the majority depending on day-to-day receipts to maintain deliveries to consumers. Dealers look for increased activity in collections from the rural districts towards the end of next month but in the meantime are depending on local source for supplies. Offerings by war plants are below normal, with little indication of early betterment. Automobile wreckers are out of the market with most yards cleaned out.

Steel In Europe . . .

London—(*By Radio*)—Demand for structural steel in Great Britain has eased materially but plate requirements are sustained at a high level. Sheets also are active. The aircraft industry is pressing for larger tonnages of many steel products, especially in alloy grades. Coke supply has become more plentiful and is meeting all requirements.

Nonferrous Metals . . .

Nonferrous Prices, Page 117

New York—With allocations of copper for September delivery complete, inductions are that Metals Reserve Co.'s stockpile will be expanded. The reserve has been dipped into from time-to-time to round out requirements and now expected replacements will replenish the inventory which, however, will not reach the higher point of some months back.

Better balance between consumer inventories and consumption is being attained also and allotments for September were cut back in many cases, in some as much as 50 per cent. A few consumers got more copper than they did in August and others requested a lighter tonnage and will draw heavier on scrap. This applies notably to some brass mills.

Foundries' requirements for ingot are lighter and some are in a position to draw on inventories while the scrap sit-

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uation with ingot manufacturers is easier.

There is little, if any, decline in the overall demand for copper and zinc. Total consumption, including Lend-Lease, holds near the high point reached earlier in the war.

The labor problem from mine to fabricator remains acute, although some hope is held out for better production during the fourth quarter. War Production board has ordered the segregation of all beryllium-copper scrap, demand for which in war production is mounting.

High grade zinc is in better supply than other grades at the moment. In recent months the total supply and production of zinc has about balanced with some moderate additions to reserves during some periods.

DPC Authorizes Plant Expansion, Equipment

Defense Plant Corp. has authorized the following expansions and equipment purchases (figures are approximate):

Rudy Furnace Co., Dowagiac, Mich., $65,000 for equipment at a plant in Michigan.

Increase in contract with American Aviation Corp., Jamestown, N. Y., $1,150,000 for additional facilities at plant in New York, making overall commitment $1,240,000.

National Aircraft Equipment Co., Los Angeles, $40,000 for equipment at plant in California.

Standard Tube Co., Detroit, $25,000 for equipment at plant in Michigan.

American Radiator & Standard Sanitary Corp., Pittsburgh, $650,000 for plant facilities in Illinois.

Increase in contract with Iron Fireman Mfg. Co., Cleveland, $80,000 for additional facilities at plant in Ohio, making overall commitment $190,000.

Increase in contract with Republic Steel Corp., Cleveland, for additional plant facilities in Illinois costing $1,245,000, making overall commitment $80,000,000.

Increase in contract with Ex-Cell-O Corp., Detroit, for additional equipment at a plant in Michigan to cost $220,000, making overall commitment $8,425,000.

Increase in contract with Diamond Iron Works Inc., Minneapolis, for additional equipment at a plant in Minnesota, $30,000, making overall commitment $150,000.

Increase in contract with Joshua Hendy Iron Works, Sunnyvale, Calif., for additional facilities at a plant in California, $175,000, making overall commitment $4,300,000.

Increase in contract with Packard Motor Car Co., Detroit, for additional equipment at a plant in Michigan, $1,500,000, making overall commitment $2,500,000.

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STRUCTURAL SHAPES . . .

STRUCTURALS PLACED

525 tons, hangar, Chance Vought Aircraft Corp., Stratford, Conn., to Bethlehem Fabricators Inc., Bethlehem, Pa.; E. M. Moss Co., Bridgeport, general contractor.

100 tons or more, structural steel for hangar, Miami Master airport, Miami, Fla., to Virginia Bridge Co., Roanoke, Va.; unit price basis.

STRUCTURALS PENDING

100 tons, approximate, fixed wheel gates, Friant dam, Bureau of Reclamation, Denver; American Bridge Co., Denver, low on two units, $34,364 f.o.b., Gary, Ind.

REINFORCING BARS . . .

REINFORCING STEEL PENDING

700 tons, addition, Edward Hines Jr. hospital, Chicago, for U. S. Veterans Administration; bids Aug. 20.

RAILS CARS . . .

FREIGHT CAR AWARDS

Chesapeake & Ohio, 125 fifty-ton all-steel drop-end gondolas, to American Car & Foundry Co., at Huntington, W. Va. shops; 100 fifty-ton composite flat cars to Ralston Steel Car Co. at Columbus, O.

Nickel Plate, 300 fifty-ton single-sheathed composite box cars to General American Transportation Corp. at East Chicago, Ind.; 200 fifty-ton single-sheathed composite box cars to Pullman Standard Car Mfg. Co., at Michigan City, Ind.; 500 fifty-ton composite hopper cars to American Car & Foundry Co., at Huntington, W. Va. shops, subject to WPB approval; 50 seventy-ton drop-end composite gondola cars to Greenville Steel Car Co., at Greenville, Pa.; 25 seventy-ton all-steel covered hopper cars to American Car & Foundry Co., at Madison, Ill., shops.

Lehigh Valley, unstated number of hoppers and gondolas to Bethlehem Steel Co., Bethlehem, Pa.

Pere Marquette, 100 seventy-ton drop-end composite gondola cars and 100 seventy-ton composite flat cars to Greenville Steel Car Co., at Greenville, Pa.; 25 seventy-ton all-steel covered hopper cars to American Car & Foundry Co., at Madison, Ill., shops, subject to WPB approval.

FREIGHT CARS PENDING

New York, New Haven & Hartford, 100 seventy-ton flat cars; bids asked.

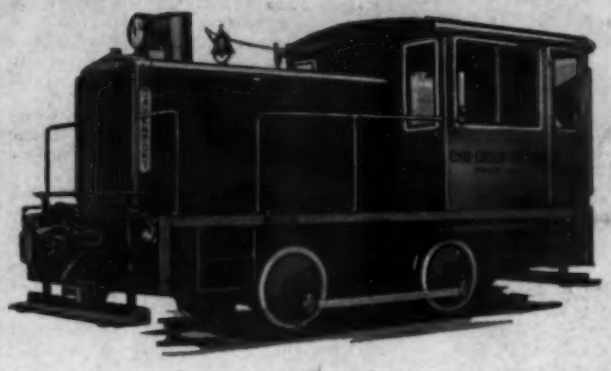
STEEL RAILS PENDING

New York, New Haven & Hartford, unstated tonnage of rails; bids asked.

LOCOMOTIVES PLACED

Carnegie-Illinois Steel Corp., six diesel-electric and six steam, 60 and 35-ton class, for scrap and ingot handling, Homestead Works, to H. K. Porter Co. Inc., Pittsburgh.

ONE EYE ON THE FUTURE



MOST business men are doing a lot of solid thinking against the day when hostilities cease. Nor are they neglecting for an instant the grave responsibilities of war. They drive themselves in support of increased production. They are positive, dependable units in the unbeatable aggregate we call Democracy. The time they give to post-war planning simply adds to the fervor of their war service because it makes them see more vividly the stakes for which we are fighting. No wonder many are giving thought NOW to the superb performance of Better-Built Davenports on those bigger haulage operations that merely await the passing of a little more time—until VICTORY.

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Today, our facilities are devoted to the production of Davenport Locomotives for WAR. Thus, we are able to accept but few orders from private customers. We are, however, perfectly willing to assist in the determination of sizes and types of locomotives required when the shooting is over. This will insure early post-war deliveries. We have been constantly alert to improvement throughout this period and will offer power units of more outstanding value than ever before.

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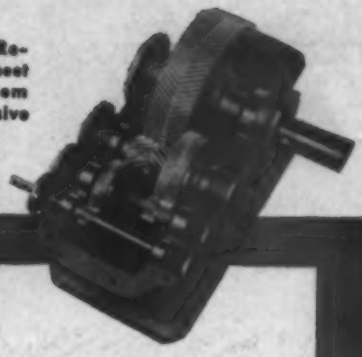

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Backlogs Reduced to Average of Four Months, with Delivery Easier

New York—Orders for machine tools are approximately one-third shipments and the latter are declining. The overall backlog of the industry is slightly over four months; drop in shipments will be accelerated each month during the remainder of the year. Unfilled orders are being expedited to get the tools into war production. By the end of the year the relationship between orders and deliveries should be on a near-normal current basis with the backlog influence a minor factor; builders are now quoting 60 to 90 days on lathes and standard milling machines.

For aircraft, orders continue to trickle in, also single tools for improved precision operations in plants already tooled. While screening of preference rating certificates for machine purchases, aimed at getting existing tools into use, tends to keep considerable potential buying at a minimum, unforeseen changes in the war program create some new requirements.

Inquiries from locomotive shops, cut back on tanks, are notable, marking a revival in need for caterpillar tractors, bulldozers and heavy outdoor machinery in the wake of the armies. A substantial number of new tools is required for these shops, while an Elizabeth, N. J., war contractor is placing 18 machines, including grinders. Thus while buying has slumped far from the peak, the industry has not become static as regards new demand. Need for single tools for improved economical operation and efficiency is heavier than appears on the surface, but this type of purchasing is held down by restrictions on new orders.

Machine builders with numerous lines can deliver one tool in a week or two while another in the same shop may be extended five months or more. Operating much the same equipment for the production of most units in the line, some is needed for the more extended units, but at reduced schedules, which complicates the conversion to other products throughout the plant. In many centers the labor situation as to quantity has eased and improved some in quality; some shops are confronted with still lower operating schedules and the maintenance of war-swollen labor forces is further endangered. To date employment has been partially held by widespread withdrawal of subcontracting.

In conversion to other products, making slow progress in some directions and more rapid in others, machine builders in many instances become sub-contractors rather than prime, a new experience for many.

In this connection the volume of direct war materials likely to be placed with machine builders during the remainder of the year or in 1944 will not nearly match the difference between machine tool production during the months ahead and the maximum peak rate. The maximum output was attained by substantial subcontracting and peak efficiency with use of skill and equipment for which shops were best adapted. In conversions, engineering skill and equipment are intact, but must be applied to new products, with additional equipment held to a minimum to conserve expenditures, man-hours and new machines.

Reductions in material allotments to machine builders is the natural consequence of declining output; nevertheless, the supply situation is easier and deliveries of some materials, on order for weeks, are being made at a time when the demand has slackened, ball bearings, motors, fixtures and other parts, including some high speed steels. This is resulting in some stop-shipment orders and scattered cancellations. In most instances conversions to direct war materials require new steels and materials, frequently more steel in relation to normal output per unit.

Lodge & Shipley Enters Subcontracting Field

Lodge & Shipley Machine Tool Co., Cincinnati, manufacturer of lathes, with a backlog of four months' production, has closed contracts for manufacture of other products as machine tool orders are completed. New lines include diesel engine and aircraft propeller parts and several other types new to this company.

Diesel engine parts are being made under a subcontract with General Machinery Corp., Hamilton, O., the principal item being a Chilton damper weight, weighing 500 pounds, particularly suited to the company's specialized type of equipment.

Subcontracts have been signed with Aero Products Corp., a division of General Motors Corp., for a variety of airplane propeller parts. This work is made possible by an easy conversion of precision machinery and skilled workers. Production under full operation will be as high as 8000 pieces per part monthly.

what's New on STAINLESS WIRE?

War has found so many new uses for Stainless Steel and Stainless Steel Wire that the supply continues to grow more critical.

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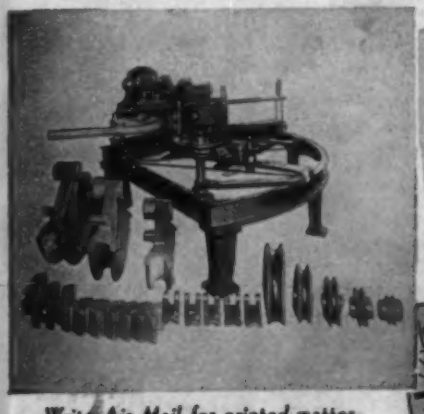

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Current Postwar Planning Far Ahead of That in 1918

(*Concluded from Page* 43)

considerable portion of the recess period in Washington.

The bills under study, as set forth in the July 19, Aug. 16 and other issues of STEEL, would provide for the financing of reconversion by individual companies; for the use of public works projects to supply employment; for federal aid to states and communities in setting up public works projects; for control of the liquidation of government-owned goods, such as army blankets, shoes, airplanes and many other items; for a more careful contracts renegotiation set-up that would enable corporations to accumulate funds to tide them over the postwar shock.

One of the significant points of view at present that contrasts sharply with the view during World War I has to do with the disposal of our government-owned war plants. This war has thoroughly disillusioned the belief during World War I that that war was a "war to end all wars". Today's thinking in the capital city is more realistic. In both these wars we had to start from scratch. It is to be doubted that we will be caught napping a third time.

Plans Not Being Publicized

The Army and Navy have plans which for obvious reasons are not being publicized at present. These plans involve a controlled disbanding of the armed personnel after the war. They provide for retention of forces of whatever size may be deemed to be necessary to guarantee the country's future safety. They involve the extent to which government-owned armament plants should be kept intact.

It would not be surprising if most of these plants were to be manned with maintenance crews after the war to keep them in readiness. It would not be surprising if they were altered and equipped with improved or different types of equipment for the manufacture of new and improved weapons so as to be prepared for future wars. It would be surprising indeed if Congress, after learning its lesson, again would so starve the Army and Navy as to prevent them from seeking new and improved ways of waging wars.

This possibility, on the basis of military considerations, plus the manifest intention of Congress to prevent shocks to the economy through sudden and uncontrolled disposal of government-owned goods, suggests that manufacturers of machine tools and many other types of equipment may not, as they have feared, have entirely manufactured themselves out of existence during the war.

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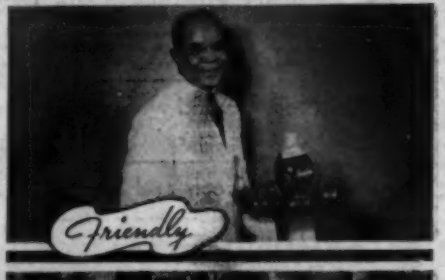

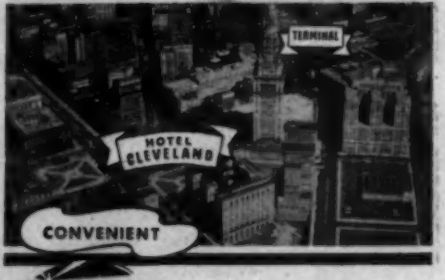

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New Ingot Price Recognizes Spread Over Eastern Mills

PERMISSION by Office of Price Administration for Kaiser Co. Inc. to sell rerolling grade carbon steel ingots produced at its plant at Fontana, Calif., at a ceiling of $43, f.o.b. established Pacific Coast ports, (STEEL, Aug. 23, page 66) is based on recognition of the usual differential in price of steel products made by eastern mills and those on the coast.

At the time Revised Price Schedule No. 6 established a uniform ceiling of $31 per gross ton on this product there was no production of ingots for sale on the Pacific Coast. Since that time the Kaiser Co. Inc. has built an integrated steel plant at Fontana, Calif., coke and open-hearth departments being completed and ingots being made. Finishing departments are still under construction and until these mills can convert ingots to finished steel the ingots must be offered for sale.

The company has been instructed to sell 17,000 tons of ingots for account of the Office of Lend Lease Administration. As a considerable tonnage is required it has been decided to use the Kaiser steel for this purpose, to allow other steel plants with finishing facilities to divert ingots they have been selling to Lend Lease Administration to production of finished products greatly needed for war.

When finishing mills are completed at Fontana later this year ingot production will be completely utilized for finished products, prices for which already have been established.

No Price Basis in Costs

The situation precludes establishment of a price based on cost, as the new plant is not complete and costs at present are not normal. Some time must elapse before the plant will be "shaken down" sufficiently to give normal figures. Accordingly OPA resorted to application of a differential over products of eastern mills as a basis for establishing the ingot price.

The spread between East and West products has been 65 cents on bars and shapes and 55 cents on plates, per 100 pounds, a difference recognized by OPA in setting price ceilings for these materials. It is assumed that had ingots been sold on the Pacific Coast at the time ceilings were established on finished items, the price would have reflected this spread. OPA has reached the conclusion that ingot sales prior to April 16, 1941, would have been based on Sparrows Point, Md., and would have used approximately the same spread as in the case of plates. The resulting price would have been $43 per gross ton, Pacific Coast ports.

The Kaiser Co. had asked an f.o.b. mill price of $45.30 per gross ton but OPA denied such a base, pointing out that Pacific Coast port prices are arrived at by adding a spread to the applicable eastern basing point prices. As cost of water transportation is approximately the same to all Pacific ports differentials never have been established. This has forced considerable freight absorption on mills located in the Pacific Coast area, since they must sell at the same price and absorb freight, regardless of their point of delivery.

Detailed statements must be made of ingot production costs from June 1 to Aug. 31 and for each month thereafter in which ingots are produced for sale. If this information indicates that the established price is not fair and equitable the order will be revised.

Canada's Pacific Coast Industry at Top Speed

Vancouver, B. C.—Across the international boundary may be found the same hectic industrial activity, labor shortage and crowded conditions which are common to all the large coast ports in Washington, Oregon and California. While shipyards are guaranteed supplies through government agencies, other steel consumers find it difficult to obtain their requirements.

This applies particularly to wholesale jobbers whose supplies come from both Canadian and United States sources on an allotment schedule. Some items are almost unobtainable. Cold-rolled items are in this category, while sheets, particularly galvanized, are extremely scarce. Export of spelter coated sheets, prohibited by the United States, has hit the British Columbia market a hard blow. Deliveries of all items are slow and unsatisfactory, frequently priorities expiring before the producer can make shipment. Plates, shapes and bars appear to be in better position as Canadian production of these items is larger and it is possible to obtain them within reasonable time.

Hardware is extremely tight, the same condition as along the entire Pacific Coast. British Columbia warehouse stocks are subnormal, as a rule orders being shipped out immediately, making it impossible to accumulate inventories.

There are seven steel shipbuilding plants along the British Columbia coast at Prince Rupert, Vancouver and Victoria. While figures are a military secret it is known that these yards are working at top capacity. While the spectacular speed records of United States yards have not been equaled, fast time is being made, it being reported that the average time of building cargo ships is about 60 days. The British Columbia yards adhere more to orthodox methods, building the structure from the keel up. Prefabrication has not been adopted. The type varies from the Liberty ships but is a model that has been found exceptionally seaworthy and satisfactory for carrying freight.

No shortage of materials is reported by the shipbuilding industry, which has subcontracted many items to smaller plants, including boilers, engines, ladders, deck equipment and other accessories. Consequently machine shops and accessory factories are all running at top speed. The yards in this area are all building the same type of vessel, the program being under the War Time Merchant Shipping of the Department of Munitions and Supply.

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CONSTRUCTION AND ENTERPRISE

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CLEVELAND—Quincraft Corp., 10520 Quincy avenue has been incorporated to manufacture screw machine products, by Hadley F. Freeman, 1310 Hanna building, agent, Herman M. Mabin and Curtis M. Clark.

CLEVELAND—Aircraft Automatic Corp. has been incorporated to manufacture and assemble aircraft engine parts and other equipment, by Harry A. Fagan, G. C. Forstner and C. Egensperger. George Saks, 1106 Marshall building, is agent.

CLEVELAND—John L. Frazier & Sons Co., 1564 Taylor road, has bought a site 60 x 148 feet on East Twenty-second street. A one-story office building and warehouse for storage of structural steel will be erected.

CLEVELAND—Cleveland Trencher Co., 20100 St. Clair avenue, Vincent S. Penote, president, is building a one-story 20 x 67-foot addition, costing $4900, to increase production facilities.

CLEVELAND—Viking Air Conditioning Co., 5601 Walworth avenue, has taken over the plant of the Rust Mfg. Co., 5600 Walworth avenue, to increase facilities for war subcontracting.

CLEVELAND — Dickey-Grabler Co., 10302 Madison avenue, Dan A. Miller, president, is building a machine shop addition 31 x 31 feet.

CLEVELAND—McKinney Tool & Mfg. Co., 1688 Arabella avenue, E. W. McKinney, president, will build a 13 x 22 coal room and a stack, to cost about $10,000.

CLEVELAND—Truscon Steel Co. let contract for erection of a sandblasting building, costing $1700, at 6100 Truscon avenue.

MASSILLON, O.—Canton Drop Forge & Mfg. Co., 207 Twelfth street, Canton, O., C. A. Branchler, president and general manager, has let contract to Brown Construction Co., 1900 Euclid avenue, Cleveland, for rebuilding plant and office building, estimated to cost about $2,000,000. McGeorge & Hargett, 9400 Quincy avenue, Cleveland, engineers. (Noted July 19.)

WARREN, O.—Sylvania Electric Products Inc., 500 Fifth avenue, New York, has acquired its fifteenth manufacturing plant for the manufacture of assembly parts for radio tubes, lighting and electronic products. Operations in the newly acquired building in Warren, containing 17,000 feet of floor space, are scheduled to begin early in September.

NEW JERSEY

BAYONNE, N. J.—International Nickel Co., 15 Oak street, will let contract soon for a one-story maintenance building and research laboratory, to cost about $50,000. Epple & Kahrs, 15 Washington street, Newark, N. J., are architects.

BAYONNE, N. J.—East Coast Shipyards, Twenty-first street, plans construction of pipefitters' and woodworking shops, general contract being awarded to Burke Construction Co., 10 Highfield Lane, Rutherford, N. J., at $50,000.

HARRISON, N. J.—Hyatt Roller Bearing Co., division of General Motors, 427 Middlesex avenue, will let contracts soon for two locker and shower room additions at plants 8 and 12, to cost $45,000, and powerhouse at plant 21. H. Smith, 427 Middlesex avenue, Harrison, is engineer.

MICHIGAN

DETROIT—Gisner & Kushner, 10400 West Seven Mile road, has been incorporated with $50,000 capital to produce tools, dies, jigs; by Isaac Gisner, 10400 West Seven Mile road.

DETROIT—Aircraft & Tool Engineers Inc., 666 Penobscot building, has been incorporated with $25,000 capital, aircraft industry; by William F. Mann, 15730 Oakfield avenue.

DETROIT—Aluminum Co. of America will take bids on additions and alterations to a sand tower this city; Malcomson, Calder & Hammond Inc., Detroit, architects, have completed plans.

GEORGIA

DECATUR, GA.—National Traffic Guard Co. has let contract to Capital Construction Co., 157 Cain street NW., Atlanta, Ga., for additions and alterations to plant, at cost of about $60,000.

TENNESSEE

CLINTON, TENN.—Clinton Engineer Works has let contract to Ford, Bacon & Davis Inc., New York for construction of a plant addition.

MISSOURI

JEFFERSON CITY, MO.—State Highway Commission has let contracts to L. V. Hites Co., City Bank building, Kansas City, Mo., for one 120-foot, one 80-foot, one 75-foot and one 60-foot steel truss spans and five 40-foot I-beam spans in Montgomery county, at cost of about $73,300.

WISCONSIN

JANESVILLE, WIS.—Parker Pen Co., Kenneth Parker, president, will take bids when priority is received, for a one-story plant addition 90 x 380 feet. S. L. Reily, 300 West Adams street, Chicago, is architect; F. A. Krehbiel, 222 West Adams street, Chicago, is consulting engineer. (Noted August 16).

MILWAUKEE—Milwaukee Stamping Co., sheet metal stampings and steel partitions, has let contract to Harry C. Breest for a one-story shop addition at 824, South Seventy-second street.

MILWAUKEE—Allis-Chalmers Mfg. Co. has let contract to Meredith Bros. Inc., for a two-story addition to tractor building No. 3, covering 50 x 50 feet.

PORTAGE, WIS.—Portage Co-op Creamery Association has plans by Klinger, Hubbard & Gohn, 218 South Barstow street, Eau Claire, Wis., for a one and two-story milk dehydrating plant.

SHEBOYGAN, WIS.—Hayssen Mfg. Co., North Thirteenth street and St. Clair avenue, has let contract for a one-story 40 x 116-foot shop addition to A. Hummitzsch, 1435 Superior avenue. (Noted June 28.)

TWO RIVERS, WIS.—Kahlenberg Bros. Co. has let contract to W. W. Oeflein Co. Inc., 5345 North Hopkins street, Milwaukee, for a one-story machine shop addition 70 x 100 feet.

WISCONSIN RAPIDS, WIS. — Consolidated Water Power & Paper Co. plans erection of two buildings for the machine shop division and one for the plastics division.

MINNESOTA

MINNEAPOLIS, MINN.—General Mills Inc., mechanical division, has let contract to August Cederstrand Co. for a one-story shop addition 44 x 80 feet.

MINNEAPOLIS, MINN.—Twin City Concrete Pipe Co. has been organized by Joe Lambert to manufacture concrete culvert pipe at a new plant being built at 215 Second street, Southeast.

MINNEAPOLIS, MINN.—Terazzo Machine & Supply Co. Inc., Peter Vinella, president, has let contract to C. O. Field Co. for a one-story plant addition 40 x 40 feet.

MINNEAPOLIS, MINN.—R. C. Hitchcock & Sons, 3023 Snelling avenue, patternmakers, have let contract to Henry K. Lindahl, 3744 Seventeenth avenue South, for a one-story addition to foundry, 48 x 64 feet and 20 x 24 feet.

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Rustproofing Co., 1060 Tenth avenue Southeast, has let contract to W. A. South Co., 126 South Tenth street, for a one-story addition 60 x 74 feet.

ST. PAUL, MINN.—National Bearing Metals Corp., 626 Armstrong avenue, Harry E. Conners, district manager, has let contract to William Baumeister Construction Co., Pioneer building, for a two-story addition 44 x 73 feet. Toltz, King & Day Inc., Pioneer building, are architects and engineers.

ST. PAUL, MINN.—St. Paul Engineering & Mfg. Co., formerly St. Paul Foundry Co., has been given Defense Plant Corp. authority to spend $90,000 for enlargement of facilities.

ST. PAUL, MINN.—Northwestern Aeronautical Co., John Parker, president, Wold-Chamberlain airport, Minneapolis, Minn., has taken over the American Radiator Co. plant at 692 North Prior avenue, and will convert it to glider production. The plant was acquired in 1942 by Defense Plant Corp. for aluminum production and was expanded but later was deemed unnecessary.

WINONA, MINN.—Northwest Flax Industries Inc., John A. Johnson, president, has been given Defense Plant Corp. approval for construction of a plant to process flax straw for use in rayons and plastics, to cost about $215,000.

TEXAS

HOUSTON, TEX.—McEvoy Co., 600 Milby street, has let contract to P. M. Marshall, 2216 Congress avenue, for a plant building.

HOUSTON, TEX.—Oil Tool Mfg. Co., 1318 Nance street, has had plans prepared for a steel and brick plant building.

NORTH DAKOTA

MANDAN, N. DAK.—Northern Pacific Railway Co. has let contract to Meinecke-Johnson Co., Fargo, N. Dak., for a 60-foot addition to its roundhouse.

SOUTH DAKOTA

HURON, S. DAK.—Dakota Brewing Co. plant has been bought by H. R. Brinkerhoff and V. E. Britten, Santa Ana, Calif., and will be converted into an alcohol plant, to be in operation by Jan. 1, 1944. H. H. Graham is general manager.

IOWA

CEDAR RAPIDS, IOWA—Wilson & Co., meat packers, Third street Southeast, has let contract to Sumner S. Sollitt Co., 307 North Michigan avenue, Chicago, for an addition to its power plant, 34 x 43 feet and additional equipment will be installed.

CEDAR RAPIDS, IOWA—Chicago, Milwaukee, St. Paul & Pacific Railroad Co., 80 East Jackson boulevard, Chicago, has let contract to G. A. Johnson & Co., 740 North Rush street, Chicago, for a one-story addition to its roundhouse, 50 x 100 feet.

DAVENPORT, IOWA—Zoller Brewing Co., 1801 West Third street, will rebuild its burned brewery at cost of about $30,000.

GUTTENBERG, IOWA—H. A. Wardell and E. W. Moore, Oelwein, Iowa, have bought and are remodeling the factory of Ederes Son Co., manufacturer of farm tools.

LAURENS, IOWA—Superior Mfg. Co., Albert City, Iowa, has leased the plant of the Mefferd Machine & Mfg. Co. for the duration. Paul Mefferd, owner of the plant, will take over at the end of the war and continue manufacture of tools, dies, gages, and civilian products made before the war.

MANCHESTER, IOWA—Meader Bros. are building a plant for manufacture of boxes for export shipment of meat.

MARSHALLTOWN, IOWA—Kiowa Corp., bronze and aluminum founder and manufacturer of die castings and other products, has let contract to C. F. Reimer Co. for a one-story die casting building in connection with its bronze foundry, to cost about $40,000.

WATERLOO, IOWA—Soybean Processing Co., C. E. Butler, president, plans expansion of its soybean processing plant at cost of about $80,000.

WYOMING

LARAMIE, WYO.—Monolith Portland Midwest Co., Los Angeles, has received permission from Defense Plant Corp. to build a plant in Wyoming to cost $4,000,000.

CALIFORNIA

LOS ANGELES—Clarkiron Reduction Corp. has been incorporated with $1,000,000 capital by W. L. Jencks, 409 North Maryland avenue, Glendale, Calif., and associates. B. W. Kemper, 405 South Hill street, Los Angeles, is representative.

NEEDLES, CALIF.—Atchison, Topeka & Santa Fe railroad, G. W. Harris, chief engineer, 80 East Jackson boulevard, Chicago, has let contract for bridge over Colorado river to American Bridge Co., Frick building, Pittsburgh, to cost over $500,000.

CANADA

CALGARY, ALTA.—Imperial Oil Ltd., 56 Church street, Toronto, plans to build a pump house here to cost about $100,000.

VANCOUVER, B. C.—Vivian Engine Works Ltd., 1100 West Sixth avenue, has started preliminary work on plant addition estimated to cost about $25,000, with equipment.

COLLINGWOOD, ONT.—Collingwood Shipyards Ltd., Huron street, J. S. Leitch, manager, is having plans prepared for plant addition to cost about $20,000, with three new buildings to be erected.

KITCHENER, ONT.—Canadian Blower & Forge Co. Ltd., 90 Woodside Park, has called tenders for plant addition to cost about $18,000.

KITCHENER, ONT.—Four Wheel Drive Auto Co. Ltd., 103 York street, has called tenders through B.A. Jones, architect, 125 King street West, for plant addition to cost about $10,000.

NIAGARA FALLS, ONT.—Canadian Carborundum Co. Ltd., Stanley street, has given general contract to Robertson Construction & Engineering Co. Ltd., 2 Clifton avenue, for addition to furnace building, etc., steel frame, 90 x 180 feet, to cost, with equipment, $235,000.

PORT COLBORNE, ONT.—Wood Brothers, are considering plans for erection of a machine shop to cost about $10,000.

TORONTO, ONT.—McColl Frontenac Oil Co. Ltd., 117 Harbor street, has given contract to Toronto Iron Works Ltd., 629 Eastern avenue, for three above-ground oil tanks on Cherry street, to cost about $35,000.

WOODSTOCK, ONT.—Firestone Cotton Mills of Canada Ltd., Oxford street, Eugene Sweeney, manager, has had plans prepared for plant addition one-story, 84 x 160 feet, to cost, with equipment about $215,000.

MONTREAL, QUE.—Electrolier Mfg. Co. Ltd., 5849 Boyer street, electric fixtures, hardware, castings, etc., is having plans prepared by Henry Greenspoon, 1434 St. Catharine street, architect, for construction of plant addition to cost about $25,000.

MONTREAL, QUE.—Cresswell Pomeroy Ltd., metal products, 604 deCourcelles street, in association with Department of Munitions and Supply, Ottawa, R. T. Donald, secretary, has given general contract to A. F. Byers Construction Co. Ltd., 1226 University street, at approximately $50,000 for plant addition on Harvard avenue. Building to be one story, 95 x 175 feet.

ST. JEAN PORT JOLI, QUE.—Leon & Jean Baptiste Toussaint, plans to rebuild furniture factory recently destroyed by fire, at cost of approximately $30,000.

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